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PAPERS

IN

MECHANICS.

The GOLD MEDAL *of the Society was this Session voted to Admiral* SIR HOME POPHAM, *of Greenwich, for his Telegraph, and Marine Vocabulary. The following Communications were received from him. A Model of the Telegraph, and a Copy of the Vocabulary are preserved in the Society's Repository.*

SIR HOME POPHAM presents his compliments to DOCTOR TAYLOR, and as he observes that in the register for premiums distributed by the Society of Arts, &c. that medals have been given for various modes of communication, he takes the liberty of requesting DR. TAYLOR to submit to the Society, first, his Marine Vocabulary, or Telegraphic Signals; then, his Telegraph with its explanation, and having only two arms, is capable of making two hundred and twenty thousand signals.

There are other points of this system, which SIR HOME

wil

will be very happy to explain personally to the Society, but which, for obvious reasons, he cannot well transmit.

Greenwich, 27th February, 1816.

To C. Taylor, M. D. Sec.

SIR,

I beg you will do me the honour of laying before the Society of Arts, &c. the Sea Telegraph which I have lately invented, and just now completed, to the best of my judgment.

This forms the sixth part of the general system of flags and signals for universal communication, viz. 1st, New system of flags, and method of combining them: 2dly, Marine Vocabulary: 3dly, Code of Admiralty signals, not presented to the Society: 4thly, New semaphore, or telegraph for communicating by land: 5thly, New method of cutting buntin, and making flags: and 6thly, Sea Telegraph for general communication, and which I hope will be found of universal benefit to the commercial interests of Great Britain, and to many purposes of *convenience* and *humanity*, by its facility of communication.

I am, Sir,
Your most obedient humble Servant,
HOME POPHAM.

Greenwich, 26th March, 1816.

To C. Taylor, M. D. Sec.

Marine Vocabulary and Telegraph, particularly adapted to the Commerce of Great Britain.

It has long been considered desirable that a system of general communication at sea should be established for the merchant ships of this country; but the first cost of a set of flags, and the annual wear and tear, presented a very strong objection to such an establishment, except in the East-India Company's service. This difficulty is now removed, by the application of a sea telegraph, which will not in the first instance cost more than fifty shillings; and its wear and tear will not be five shillings a year.

This telegraph applied to the Commercial Marine Vocabulary, will afford the greatest facility of communication to merchant ships, and furnish them with the means of establishing every description of commercial intercourse and correspondence; and of concentrating in the metropolis the most general information from every part of the world. The nature and state of all the foreign markets may be ascertained by the reciprocal communication of ships when crossing each other at sea. Each merchant will know the exact situation of his ship, and will receive intelligence of the state of the markets at the last place she sailed from; the time she is likely to arrive at her middle port; and when she may probably be expected at her home destination. All the wants of a ship may be communicated, when a corresponding telegraph is established, before it could be practicable for a master to get on shore; by which means much time would be saved in the general refitment of a ship.

These advantages apply principally to the commercial interests; but there are other considerations, particularly of *humanity*, which grow out of this system; and, by a regular and well-applied communication from the shore, in cases where shipwrecks cannot be avoided; by which the lives of many individuals may be saved, and their exertions insured for the protection and security of the property committed to their charge.

The vocabulary may be also used as a cypher with a secret key; by which means those who possess it will be able to carry on, in a secret manner, a correspondence with their respective ships.

HOME POPHAM.

Reference to the Engraving of Sir Home Popham's *Telegraph. Plate* 14.

The telegraph is composed of a lofty hexangular framing of timber, supported upon a pivot below, and capable of turning, in a collar in the roof of the cabin, to any direction required: from the upper part of this frame, two arms, each turning upon an axis, can be projected, and retained at any angle by means of the machinery included in it.

Fig. 1, is an external front view of the telegraph, showing the two winches or handles, which communicate motion to the arms, as well as to the two indices, which point out upon the dial-plates, to the persons working the telegraph in the cabin, the situations of the arms above.

Fig. 2, is a side view of the telegraph.

Fig. 3, is a vertical section of the telegraph, in the same position as fig. 1, showing the situation of the wheel-work by which it is actuated; but, as these parts are necessarily too minute to be readily understood, they are delineated on an enlarged scale, in figs. 4, 5 and 6; in which *a*, *a*, are two bevil wheels on the same axis with the handles; these communicate motion to two others, at right angles to them, *b*, *b*, which give motion to two vertical rods *c*, *c*, passing up through guides in the shaft of the telegraph, and which have two endless screws upon each of them, viz. two below, *d*, *d*, working into two endless screw-wheels *e*, *e*, upon the arbors of the indices, and two above *f*, *f*, working into two endless screw-wheels, *g*, *g*, attached to the arms of the telegraph, and which thus give similar movements to the indices and arms. All the endless screw-wheels have a similar number of teeth in them. The upper endless screw-wheels have sockets, upon which the arms are fitted, and are turned round with the wheels, by means of two studs, which project from their faces, and enter into holes made in the arms.

Fig. 7, represents, on the same enlarged scale, the endless screw *f*, and wheel *g*, attached to a part of the arm of the telegraph by the studs *h*, *h*, and also the two rods *c*, *c*, one of which terminates at the endless screw *f*; whilst the other passes up through a guide to the upper arm of the telegraph.

Fig. 8, is an horizontal section at E, fig. 3, also on an enlarged scale, showing the external appearance of the iron case which covers the endless screw and wheel *h*, *h*, having two studs fixed upon it, which enter into the lower arm of the telegraph.

Fig 9, is an horizontal section on the same scale, through the base of the telegraph at A, fig. 3 : *i*, is a circular plate of cast iron, made fast to the floor of the cabin, in the center of which is a step, or cavity, *k*, in which the pivot of the telegraph acts ; and round it are holes, into which the bolt, *l*, can be let fall to secure the telegraph in any required position : the bolt, , also passes through two loops, *m*, *m*, figs. 1, 2, and 3, in the shaft of the telegraph to steady it ; but can be occasionally taken out, and thrust horizontally into the hole, *n*, fig. 3, so as to act as a lever to turn the telegraph round.

Fig. 10 is an horizontal section, likewise on the same enlarged scale, through the shaft of the telegraph at C, fig. 3: *c*, *c*, the two rods, passing to the two endless screws.

Fig. 11 is another horizontal section through the shaft at D, fig. 3, in which are shown the two openings at the sides, *o*, *o*, to let the arm of the telegraph pass.

Fig. 12 is a similar section at F, fig. 3.

Fig. 13 is an horizontal view of the top of the telegraph at G, fig. 3; *h*, *h*, the two studs, which enter the upper arm.

Fig. 14 is a representation of the two dial plates, on a still larger scale, to show the divisions thereon.

On the outside of the shaft of the telegraph two rows of wooden blocks, not shown in the engraving, are fixed alternately, to serve as steps; by which, and with the assistance of a rope suspended from the top, a person may occasionally ascend it to apply oil to the machinery within it.

Reference to the Engraving of SIR HOME POPHAM'S *Sea Telegraph. P.ate* 15.

Fig. 1 is a representation of the two machines which form the sea telegraph, lashed to the side of a ship, as in use; the lower ends of the parts being stepped into blocks secured to the deck.

Fig. 2, a side view of one of them; the same letters of reference applying to both figures; *a*, *a*, *a*, posts, 12 feet 2 inches high, and 6 inches thick: *b*, vanes, 6 feet 4 inches long, and 10 inches broad, fixed on the spindle *c*, and turned by means of a cord passing round the shivers *d*, *e*, which work in the centers of the posts: *f*, *f*, small wheels attached to the spindles of the shivers, *e*, and on the edge of which are marked the figures 1, 2, 3 and 4, as corresponding to the different positions of the arms or vanes: *g*, *g*, *g*, lashings, to confine the posts to the ship's side: or the posts may be fixed on trucks, to be moved from one part of the ship to the other: *h*, *h*, *h*, blocks of wood, into which the posts are stepped, if applied to the ship's side.

Fig. 2 is a representation of the shivers *d*, *e*, and small wheel *f*, with the cord viewed in front, without the vane.

Fig. 4 is a side view of the same parts, and in which the vane *b* is also shown.

The arm on the foremost post, when placed in the four positions diagonally to the post, exhibits the numbers 1, 2, 3, and 4; and the arm on the outermost post the numbers 5, 6, 7, and 8.

The THANKS *of the Society were this Session voted to Admiral* SIR HOME POPHAM, *of Greenwich, for his Section of Flags cut on an improved system. The following Communications were received from him on the Subject, and a Section of the Flags is preserved in the Society's Repository.*

SIR HOME POPHAM presents his compliments to DOCTOR TAYLOR, and he takes the liberty of sending him a section of the flags cut on an improved system, and which have already been exhibited at Deptford before the Committee from the Society of Arts, &c.

By the new method of cutting the flags, it will be seen, that the selvages of the buntin are brought on the outer edges of the flags, and the gorings in the center; by which means the outer edge is susceptible of the least air of wind, and when the flag blows out, the gorings assist in keeping it out. Whereas, the old flags had a hem on the outside, which rendered them difficult to be moved without a fresh breeze, especially in damp and rainy weather, as the hem then became very heavy: besides it is impossible, from the nature of the buntin, to sew a straight seam, for the instant it is cut it will become in some degree curved.

Greenwich, 25th March, 1816.

To C. TAYLOR, M.D. SEC.

CERTIFICATES *in favour of* SIR HOME POPHAM'S *Section of Flags.*

HAVING been at sea all my life-time, many years in the King's service, and now Master-attendant in his Majesty's Yard at Woolwich, I can safely state, that I never saw a triangular flag or a corvette made with selvages on the outside, till Sir Home Popham proposed it.

These description of flags are not much used in the merchant service, except the East-India Company's. It is a very superior method of cutting flags; and Nicholas Heath, the tailor and flag-maker of his Majesty's Yard at Woolwich, (to whom I have read this paper,) says he never saw any flags cut in this manner before, and, as a declaration of which, he has subjoined his name. It also insures an immense saving of buntin.

THOMAS BROWN, Master Attendant.

NICHOLAS HEATH, Tailor.

Woolwich Yard, 1st April, 1816.

SIR,

I HAVE received your note of the 22d, to wait on the Committee of Arts this evening, concerning the method of cutting flags by Sir Home Popham: I am sorry my duty prevents me from attending this evening, but will at any other time if required.

I beg leave to enclose a Certificate signed by the Storekeeper of this dock-yard and myself, which you will be pleased to lay before the Committee.

I have the honour to be,

Your very obedient humble Servant,

THOMAS BROWN.

His Majesty's Dock Yard, Woolwich,
24th April, 1816.

To Mr. WOODFALL, Assistant Secretary, &c.

THESE are to certify, that flags made on Sir Home Popham's principle have the following good qualities, viz.—The flags and pendants are much better shaped, sewed, lighter, and no waste of buntin, they, being all cut out to the selvage, do not require to be turned in, as was the case in making the flags on the old plan, which could not be avoided. Flags made on the new plan appear to blow out much better than the old, and will not be so liable to contain wet, but must dry much sooner; for, whenever buntin comes to be put away wet or damp, it is sure to rot.

Dated at his Majesty's Yard at Woolwich, the 24th day of April, 1816.

THOMAS BURNETT, Storekeeper.
THOMAS BROWN, Master Attendant.

Extracts from two Letters from Thomas Netherton, Esq. Clerk of the Survey of Deptford Yard, to Mr. Richard Peacock, of Chancery Lane, on the subject of Sir Home Popham's mode of cutting Buntin.

Deptford Yard, dated 2nd April, 1816.

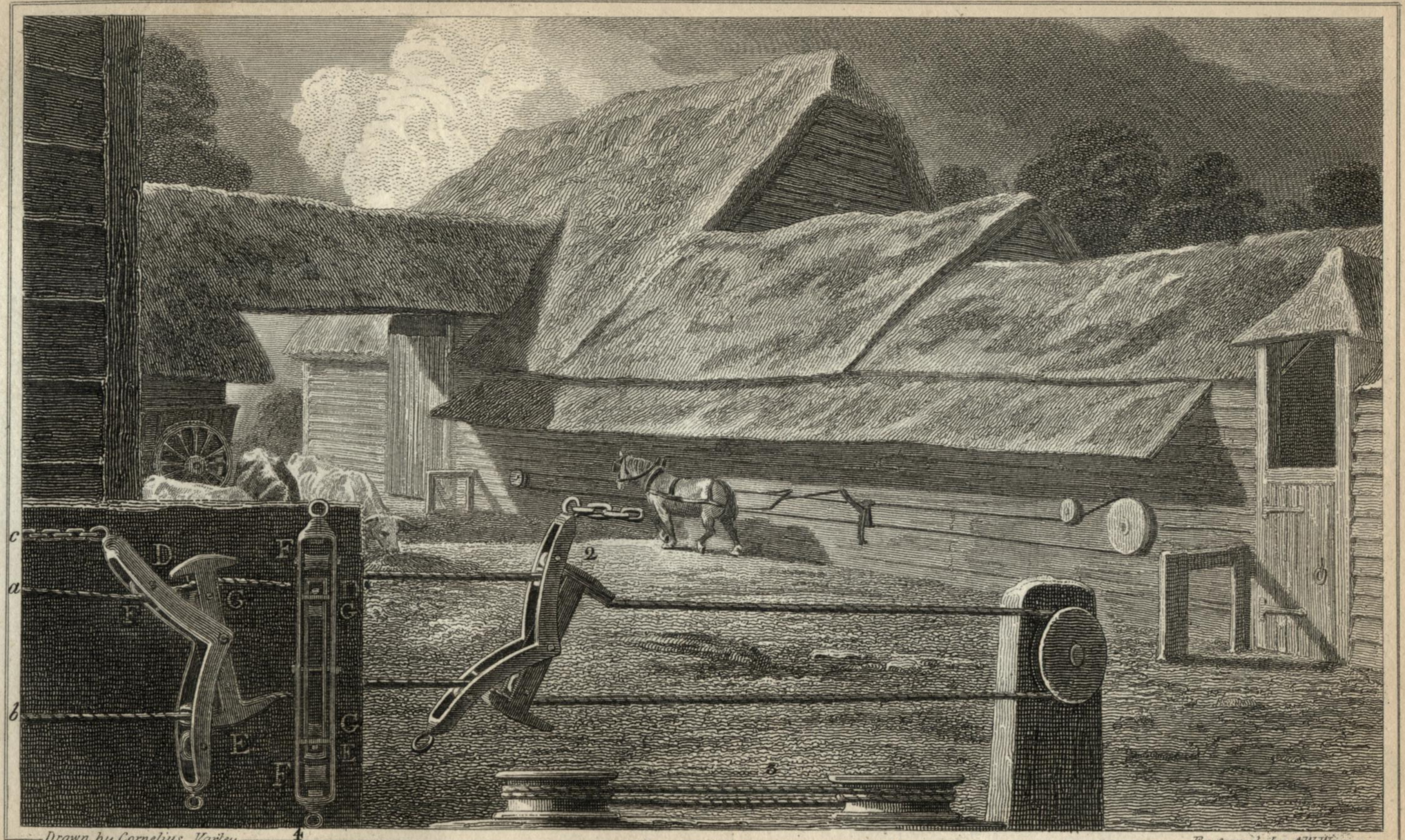
" DEAR SIR,

" In return to your favour respecting Sir Home Popham's Signal Colours, I have communicated with his Secretary on the subject. A great saving of buntin, as to wear, arises from the selvage being on the outside of the flag. The flag will likewise open to the wind better than the old ones; and many other advantages attend the plan, which will be fully explained on Thursday evening by Mr. Brown, the Master Attendant at Woolwich Yard, who will meet the Committee for that purpose."

Received 4th April, 1816.

" MY DEAR SIR,

" In addition to my letter of yesterday, on the subject of the Signal Flags and Pendants invented by Sir Home Popham,



Drawn by Cornelius Varley — Engraved by A.W. Warren

Doctor Cartwright's Traversing Apparatus.

ham, I have to day had reference to and compared them with those formerly in use; and, I am fully convinced of their superior utility, and, I may add, from the long experience and observation I have had opportunity of making on the subject, that the mode of cutting and making is original."

The GOLD ISIS MEDAL *was this Session voted to the Rev.* EDMUND CARTWRIGHT, *D. D. of Hollanden House, near Tunbridge, Kent, for a Traversing Apparatus. The following Communications were received from him, and a Model of the Apparatus is preserved in the Society's Repository.*

SIR,

I HAVE lost no time in sending you my cheap and portable substitute for a horse-mill. I have enclosed also a paper on the subject of it, which may be of use to those who are not much conversant with mechanical matters.

I am, Sir,
Your obliged Servant,
EDMUND CARTWRIGHT.

P.S. When you see Dr. CHARLES TAYLOR, I will trouble you with my compliments to him, and tell him how sorry I was to hear of his indisposition.

Hollanden House, near Tunbridge, Kent,
January 8th, 1816.

To Mr. GILL, St. James's Street.

A cheap and portable Substitute for a Horse-Mill.

It must be obvious to any one, in the least conversant with the subject, that many valuable machines, requiring more than a man's power, are prevented getting into general use, by the heavy expence of erecting a horse-mill to work them. A machine, the prime cost of which would, in many cases, exceed ten or twelve pounds, cannot be set in motion, by means of a horse-mill, under five or six times that sum.

To remedy this inconvenience, I tried several methods to produce a rotary motion by making the animal that was to produce it traverse backwards and forwards in a straight line, instead of moving in a circle. After several less happy attempts, I had the good fortune to hit upon a method, which, for simplicity and cheapness, can hardly be improved upon. It is this: A pulley being put upon the axis of the machine, an endless rope or cord is passed over it, which is carried out to any given distance over another pully fixed to a post, or any thing else that may be convenient. To this endless rope or cord the animal is attached, by means of the apparatus which accompanies this paper, which is so contrived, that, as the animal traverses one way, the apparatus grasps that part of the cord which lies on the top of the pullies; when he returns back, the apparatus grasps that part of the rope or cord which passes on the lower side of the pullies, thereby making the machine always to revole in the same direction, notwithstanding the animal's motion is reversed.

It may be objected to this mode, that, while the animal is turning, time will be lost by the machine standing still. Upon the whole, there is reason to believe, that there is little or no actual loss, because, while the animal is turning, his labour ceases, and this momentary pause prepares him for a fresh exertion. This objection, however, is at once done away, by having a fly-wheel on the axis of the machine, which will keep up its velocity for a longer time than while the animal is turning round. It is needless to point out the great superiority of this mode of draft to that in which the animal walks in a circle. It may be calculated as nearly three to two.

In many machines, thrashing-machines for instance, it is a great desideratum to have them portable. This, it is true, is already done, but not without expence and considerable trouble and inconvenience, the mill-work required to give them motion being cumbrous and heavy, and requiring more care and skill to take them down, and put them up again, than common farming servants have to bestow. The whole apparatus, in the way now proposed, a man may carry in his hand.

There are two inconveniences in driving a machine by means of a cord and pulley, in the common way, especially if loaded with much work, which every one must have experienced; if the cord is not sufficiently tight, it is liable to slip, and, to give it the necessary degree of tightness, occasions such a load of friction upon the pivots of the pullies, as to add very materially to the labour. These inconveniences, however, may easily be got over by a very simple contrivance, which, as perhaps it is not universally known, I will describe. The width of the pulley upon the face should be about three diameters of the cord, and conical, and the higher side of the face should exceed the lower by about a semi-diameter of the cord, which must be laid on upon the higher side, and trussed once entirely round the pulley. It will thus embrace the pulley three times as much as it would have done if laid on in the common way. The consequence will be, that the cord may be comparatively slack, and will lay no more friction on the pivots of the pullies, than would be laid on the pivots of the wheels in machines working by tooth and pinion.

P. S. The smith who made the apparatus, in consequence of its being a new thing, and requiring many little alterations before it was finished exactly to my mind, charged for it twenty shillings. Now that there is an exact pattern to go by, it would no doubt be made for half the sum. The cord which I made use of was rather better than the third of an inch in diameter. My animal was a small ass.

Sir,

In compliance with your opinion, I have endeavoured, on the other leaf of this paper, to make a drawing, such as it is, of the manner in which the ass was yoked to the traversing implement. Should there be a plate of it, your engraver must rectify the errors in perspective and proportion, which his eye will immediately point out to him; and he must have the traversing implement to copy from, which ought to be done accurately.

I am, Sir,
Your obedient Servant,
EDMUND CARTWRIGHT.

To Mr. Gill, &c.

Jan. 16, 1816.

The implement which I sent was not a copy, but the *actual thing* which I made use of.

Reference

Reference to the Engraving of Dr. CARTWRIGHT'S *Apparatus for applying Horse Powers to Machinery, in a straight, instead of circular, Walk. Plate* 16.

A horse is working the machine by means of a revolving band, extended along the barn side by two pullies, one of which is on the axis of the machine within; the apparatus, which attaches the horse, is shown larger on another revolving band *a*, *b*. In front of the picture the horse pulls the chain *c*, which opens the upper clip, D, and bites the lower rope in the under clip, E, and pulls it along with him, (the friction of the upper rope being eased by two rollers, F and G;) and, when he returns, he pulls the chain *c* back, as shown in fig. 2, which closes the upper clip on the rope, and pulls it along; the under clip opening lets the lower rope pass through on the rollers. The chaps of the clips are cut like a rasp to hold the rope fast. At fig. 3 is shown the alternate tapering of the two pullies, to let the band slide down, while coiling on the pully, as it is passed once or twice round to get securer hold, when both are wanted to work machinery. If a large pully be used, a small one, as shown on the barn side, is placed near to render the cords parallel again, and keep the proper width for the instrument. If the pullies are high, the horse may be attached to the under end, or, if low, to the upper one. The near rope shows how the walk may be lengthened by fixing a pulley to a post, in a line with the barn side. Fig. 4, is a front view, showing the clips D and E, and the rollers F F, and G G.

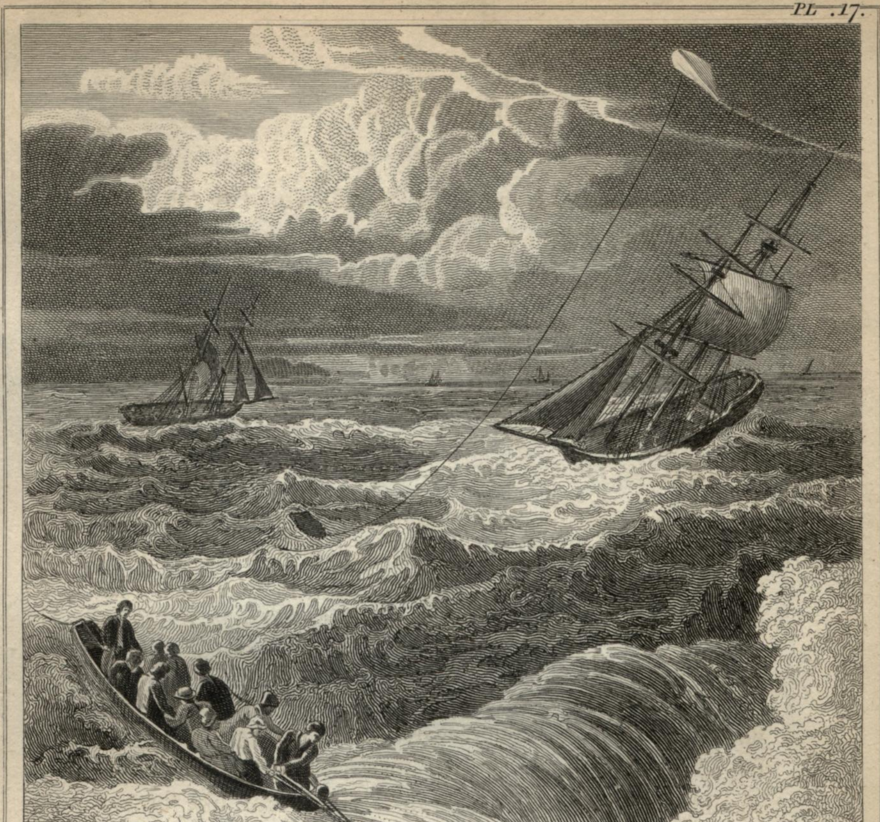
The GOLD MEDAL *was this Session voted to the Son of the late Major* CHARLES LE HARDY, *of Jersey, for a Method of effecting Communications between stranded Vessels and the Shore. The following Communication was received from his Father, Major* LE HARDY, *previous to his Death.*

SIR,

I SHOULD be wanting in humanity if I did not communicate to the Society the result of several experiments which I have lately made with kites, to establish a communication from stranded vessels with the shore. To effect which, a kite should be made of light canvas, or brown Irish, which, when clear of the vessel, should be attached to a log of wood floating in the water, by a small line connecting them. This log of wood should be shaped like a flat-bottomed boat, and should have three pieces of iron well fixed to it, like those of a grapnel. If the line of the kite was fixed on either side of the log, it would deviate to the right or left; and, if in front, it would go in the direction of the wind. If, therefore, a stranded vessel had not exactly a lea shore, or, if some parts of the shore were only accessible, yet, by means of the line, and particular mode of its attachment to the log, it would be conveyed and fixed on that part of the shore which would best answer the purpose, dragging with it a cord from the ship to the shore. Such has been the result of several experiments I have made from the rocks across St. Aubin's bay, in the presence of many gentlemen: some of them were made in stress of weather with Captain Le Geyt.

Should the Society require further information on the sub-

PL. 17.



Drawn by Cornelius Varley

Engraved by A.W. Warren

Captn Chas Le Hardy's method of communicating with ye Shore.

ject, I shall feel great pleasure in transmitting the same; and am, Sir,

Your obedient humble Servant,

CHARLES LE HARDY.

Jersey, January 28th, 1812.

To C. Taylor, M. D. Sec.

Captain Rose, R. N. attended the Committee when the subject was considered, and stated, that he thought the invention could not fail of its intended effect; nor could he suggest any improvement.

Reference to the Engraving of Captain Charles Le Hardy's *method of communicating with the Shore, from a Vessel in Distress. Plate* 17.

A kite is shown drawing a float to the shore: the wind is blowing obliquely, yet the float is coming nearly direct, the kite string being fixed on one side. Another float is ashore; part of the kite-string is shown attached to one side, and men are bringing a boat ashore by a rope from its stern, having a stronger rope from their stern to the ship.

Two other floats on the fore-ground, show their form.

The GOLD ISIS MEDAL *was this Session voted to Mr.* WILLIAM BREMNER, *of Lower Eaton-street, Pimlico, for an Apparatus for the Extirpation of Polypi. The following Communication was received from him, and the Apparatus is preserved in the Society's Repository.*

SIR,

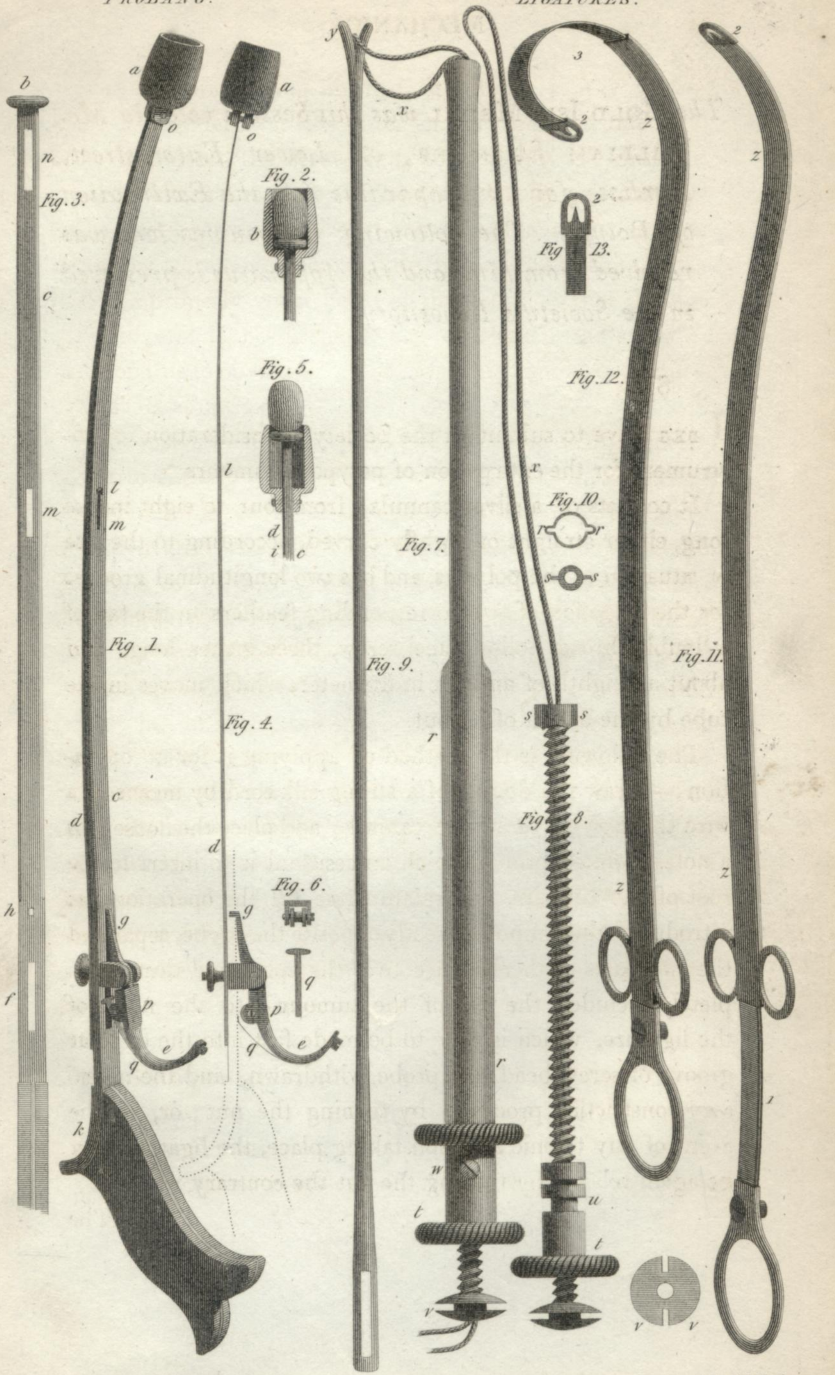
I BEG leave to submit for the Society's consideration my instrument for the extirpation of polypous tumours.

It consists of a silver cannula, from four to eight inches long, either straight or slightly curved, according to the size or situation of the polypus, and has two longitudinal grooves for the reception of two corresponding feathers on the tail of a double thread hollow steel screw, three inches long, and about an eighth of an inch in diameter, which moves in the tube by the action of its nut.

The following is the method of applying it for an operation:—Draw the double of a strong silk cord by means of a wire through the screw and cannula, and place the noose into a notch-pointed probe, which an assistant is to insert to the root of the tumour, and retain there till the operation has introduced the cannula directly opposite the probe, separated the two parts of the ligature over the apex, and thus completely included the root of the tumour into the noose of the ligature, which is now to be made fast into the circular groove of screw head, the probe withdrawn, and the necessary constriction produced by turning the nut; or, in the event of any tetonic affection taking place, the ligature may be again relaxed by turning the nut the contrary way.

The

Mr. J. Goodwin's PROBANG. Mr. W. Bremner's Two Instruments for LIGATURES.



Drawn by C. Varley. Engraved by J. B. Taylor.

The operation being finished, it will be proper to tie a piece of bladder over the outer end of the instrument, in order to protect the screw frem corrosion by the fetid discharge which takes place. The bladder may be left sufficiently loose over the head of the screw, as may render it unnecessary to remove it for turning the nut; and, if the instrument be properly constructed at the point, so that the ligature may fill it, no discharge can ever reach the screw: I mention this to obviate any objection which might be adduced against its adoption.

This instrument, though extremely tight, is of sufficient power to entirely supersede that exertion of manual strength formerly employed in the extirpation of large polypi; and it is evident that whatever force was used in tightening the ligature, a corresponding resistance must have been made on the cannula; therefore, should the ligature by chance break, must not the end of the instrument be suddenly impelled against, and probably to the great injury of parts naturally tender, but in such cases frequently in an extremely irritable state? The Society will, on inspecting the instrument now before them, and the principle on which it acts, readily perceive, that its application cannot be attended with danger or difficulty, but that it may be advantageously employed for the removal of polypi, diseased tonsil or tongue, either by means of a cord or wire, as the peculiarity of the case may indicate: for the latter, with the aid of the above instrument, may be used the fortieth part of an inch in diameter, which will be found sufficiently firm to direct its own noose, without the assistance of a probe, and which, in some cases, would be the best method of proceeding, but particularly in that of polypi of the œsophagus; here, unless the tumour can be thrown into fauces by the excitement of vomiting the extirpation of it is considered impracticable[*], but, in the following way, ought certainly to be attempted;—after inserting the double of the above sized wire into a cannula, leaving the noose as wide as may easily be made to descend the œsophagus, till it has passed the tumour a considerable distance, when the cannula and one part of the wire are to be steadily held, while the other part is to be slowly drawn out; by this we dilate the noose as much as the œsophagus will admit of, and have a chance of including the tumour.

As the above operation will not give any great pain to the patient, if the operator be careful to avoid irritating the epiglottis; should the first attempt prove abortive, a second or third may succeed, in which case, the first cannula is to be withdrawn, and another substituted, the lower part of which is elastic. The remaining part of the operation has been already described.

I have the honour to be,
Sir,
Your most obedient humble Servant,

WILLIAM BREMNER.

To C. Taylor, M.D. Sec.

No. 8, Lower Eaton Street, Pimlico,
26th March, 1816.

SIR,

I have yet further to solicit the Society's attention to an instrument for conveying ligatures round deep seated arteries, but especially the subclavian.

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[*] See Samuel Cooper's System of Surgery.

It

Fig. 2

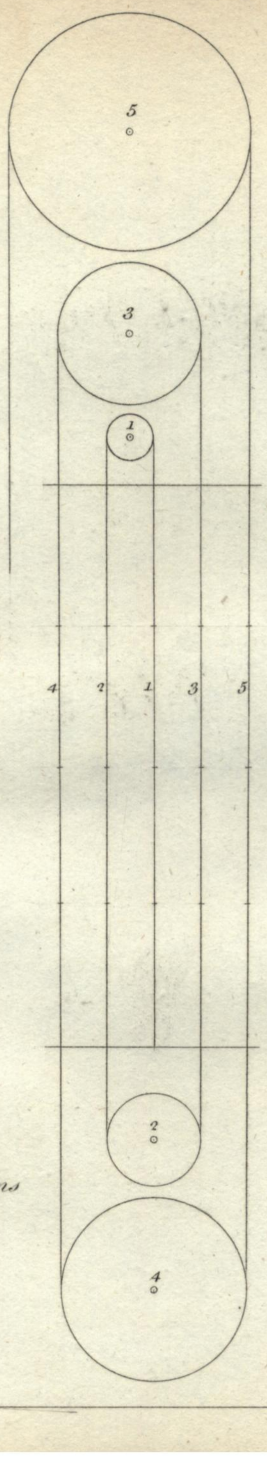


Fig. 3

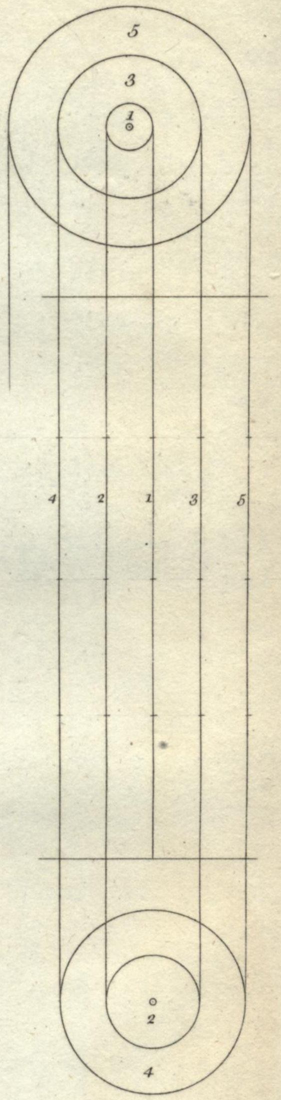
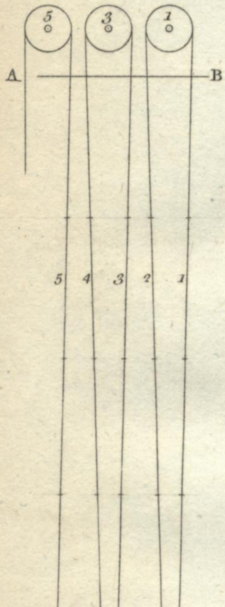


Fig. 1



Lieut. Shuldhams
Blocks.

J. Clement del.

J. Davis sculp.

Lieut. Mr Shuldham's New Iron Block.

Fig. 1.

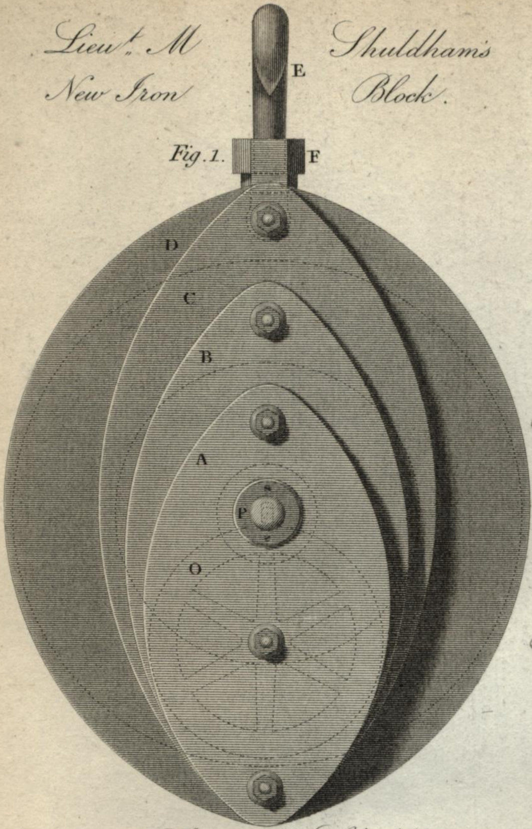
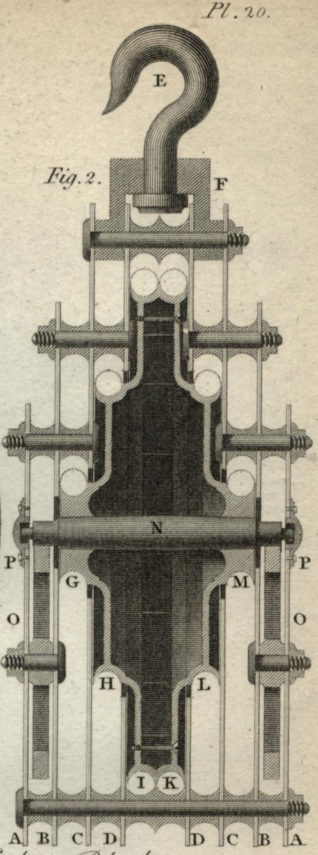


Fig. 2.



Lieut. Mr Shuldham's Wooden Block.

Fig. 3.

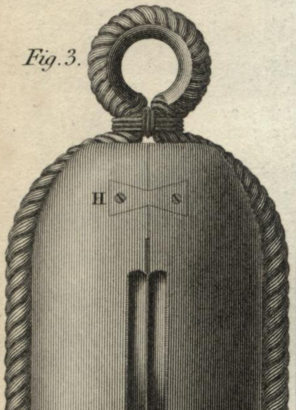


Fig. 4.

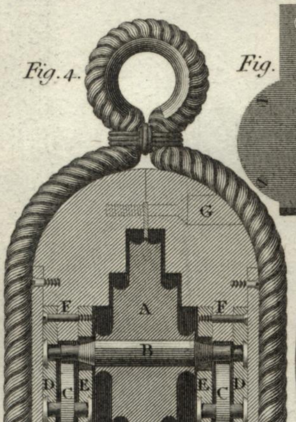


Fig. 6.

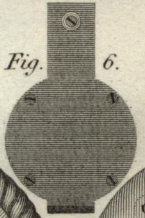
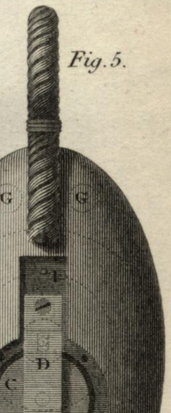
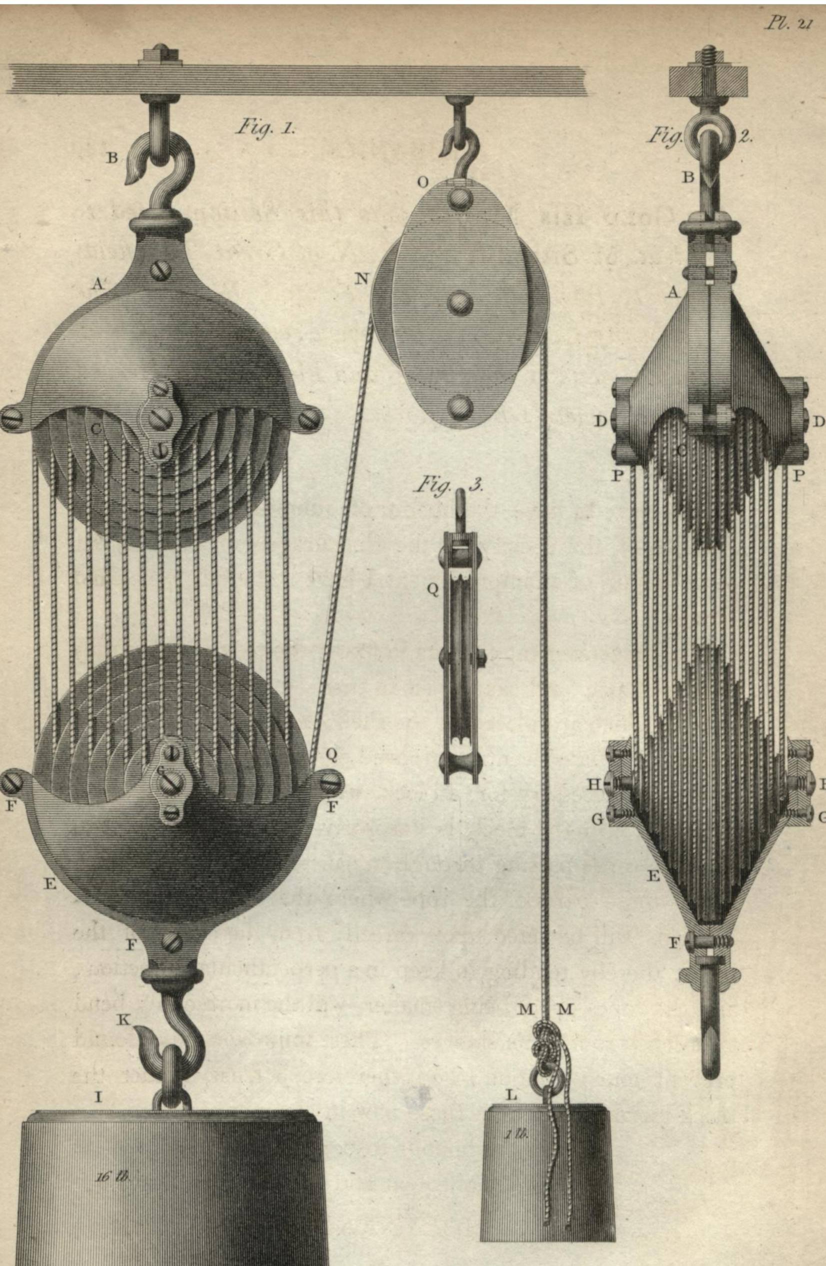


Fig. 5.



Drawn by J. Clement.

Engraved by J. Davis



Lieu.t M.r Shuldham's
New Braſs Blocks.

Drawn by J. Clement.

Engraved by James Davis.

It consists of a flat curved silver tube, through which three springs slide, which at one end are rivetted into a silver eye, but, at the other, merely slipped into a socket, to which the outer spring only is screwed, the two inner ones being permitted to move out or in, according as the instrument be in an extended or curved state.

The utility of the number of springs requires no illustration, when the visible motion of the two inner ones at the socket must convince any one that no solid spring of the requisite thickness, howsoever manufactured, can ever possess an equal elasticity, and, as the instrument must act as a solid knaculum in every degree of curvature it partakes of, both the strength and smallness of the curve are equally essential; hence the instruments hitherto constructed for the above operation, have either been found too weak to perforate, or else remained buried into the cellular substance underneath the artery; in this case, what must be the situation of the surgeon, and still more that of the patient, whose life depends on the issue? From being once similarly situated, I was induced to turn my attention to devise those means best calculated to prevent its recurrence; with this view, I constructed the above instrument, which is to be used in the following manner:—Place the noose of a ligature over the tongue, in the eye of the springs, and the vessel being laid bare, the operator is to direct the point of the instrument with his right hand, and, with the forefinger of his left inserted into the wound, be careful not to include any nerve, while an assistant, at the direction of the operator, is slowly to push forward the springs to their full extent, and again withdraw them into the cannula; by this means, the noose is thrown off from the little tongue, and may be laid hold of.

The rest of the operation is too well known to require description.

I am, Sir,
Your most obedient humble Servant,
WILLIAM BREMNER.

No. 8, *Lower Eaton Street, Pimlico,*
26th March, 1816.

To C. Taylor, M. D. Sec.

Reference to the Engraving of Mr. William Bremner's *Instrument for conveying ligatures round deep-seated Arteries. Plate* 18.

Fig. 11, is the instrument of its real size, consisting of the flat curved silver tube, *z z*, having at one end two small rings, for being more conveniently held. The three springs which slide through the tube are all rivetted to the silver eye, 2; but, at the opposite end, the outer one only is screwed into the silver socket, the other two being permitted to move freely out or in, according as the instrument changes its figure.

Fig. 12, represents the instrument when it has conveyed the ligature round the artery, 3, and ready to leave the ligature perfectly within reach.

Fig. 13, is the silver eye, showing the little tongue. It may be necessary to observe, that the springs, though common watch springs, have all been re-tempered in one close coil, as they are always left by the spring-makers too low tempered for the above purpose.

The GOLD ISIS MEDAL *was this Session voted to Lieut.* M. SHULDHAM, *R. N. of Great Titchfield-street, for improved Pullies and Blocks. The following Communications were received from him, and Models of the Pullies and Blocks are preserved in the Society's Repository.*

SIR,

I BEG leave to have the honour of submitting to the consideration of the Society for the Encouragement of Arts, &c. some models of an improvement I have made on pullies and blocks.

The improvement consists in fixing the axis of the pulley to the shieve, and causing it to turn on two single friction rollers, which are placed in the shell of the block; and, as I make use of a concentric grooved shieve, only two of those rollers are necessary for a block, whatever may be its combination; also the block is so contrived, as to admit of two separate ropes passing through it, instead of one, by which means those parts of the rope where the working power is applied, will be acted upon directly from the centre of the block, thereby tending to keep in a perpendicular direction; and the ropes, from being smaller, will the more easily bend themselves round the shieves. These improvements I found prevent much friction; and therefore, I trust, render the block more perfect than those now in common use.

I have the honour to be, Sir,
Your obedient and very humble Servant,
MOLYNEAUX SHULDHAM,
LIEUT. R. N.

No. 49, Great Titchfield Street, April 9, 1816.
TO C. TAYLOR, M. D. SEC.

CERTIFICATE.

Certificate.

This is to certify, that I have inspected Lieutenant Shuldham's improvements on blocks and pullies; and I am of opinion they would, particularly with the addition of the friction rollers, prove beneficial to the East India Company, and Merchant Service, or for any other purpose where the saving of manual labour would be an object; and, from the plan of the friction rollers being more simple than any hitherto applied to blocks, the axis of the rollers, in my opinion, would not be so liable to break or get out of order. I also certify, that I have seen his contrivance of a simple method of applying more men to move round the capstan when required; as this plan is put into exertion with great facility, and is not attended with any expence, I am of opinion that its adoption would be found generally serviceable throughout the navy.

Given under my hand, in London, this 20th day of April, 1816.

T. W. Hardy,
Captain of H. M. Yatcht *Princess Augusta.*

Reference to the Engraving of Lieutenant Shuldham's *Pullies and Blocks. Plate* 19.

Fig. 1, is supposed to be a tackle composed of a three and two-fold block, the five shieves of which turn upon separate pins, and are of equal diamaters, as they are in blocks now universally used; they are numbered 1, 2, 3, 4 and 5, to correspond with the quantity of rope passing over them, each part of the rope being also numbered. The space from A to C is four times the circumference of one of those shieves, therefore, if the block F, be hoisted up until the line C, D, cut that of A, B, it will be evident that the shieve numbered 1, will have made four revolutions; No 2 eight, No. 3 twelve, No. 4 sixteen, and No. 5 twenty. In fig. 2, the diameters of the five shieves are increased in the same proportion as they are numbered; so that, if the lower block was hoisted until the two lines at each shieve, notwithstanding they revolve on separate axes, would have made the same number of revolutions, viz. four. That being shown, it will be evident, that a pulley of my combination can be made with one shieve, by constructing the diameters of the concentric grooves of it, in proportion to the quantity of rope passing over them. See fig. 3.

Reference to the Engraving of Lieutenant M. SHULDHAM's *New Iron Block. Plate* 20.

Fig. 1, is a front view, and fig. 2, a section of the block; the same letters of reference applying to both figures; it is constructed of eight wrought iron plates, the shapes of four of which ABCD, are shown in fig. 1; and the other four, on the opposite side of the block, are similar to them; these are united together by screw-bolts, with collets put in between the plates, to keep them at a proper distance from each other; the hook E, turns in a hole made in the staple F, thus forming a swivel.

The pulley is made of cast-iron, having three concentric grooves on each side of it, as shewn by the letters GHIKLM, fig. 2, and is made hollow, for the sake of lightness: it is formed in two similar parts, which are joined together by screws near its outward circumference : it is made fast upon the axis N, instead of turning thereon, as is usual; and the axis has two pairs of necks, formed truly cylindrical; the largest of which are supported by, and turn upon, the two friction wheels O, O; the smaller necks are received into two hard steel caps P, P, screwed firmly to the iron plates, A, A, in order to keep the axis in its place: these caps have oblong holes within them, with flat bottoms, which fit the smaller necks of the axis sideways, but allow them to rest upon the friction wheels; and the flat bottoms of the holes in the caps are made to touch the ends of the axis, which are made a little convex in their centers; and thus diminish the friction, sideways, of the shoulders of the axis.

Reference to the Engraving of Lieut. M. SHULDHAM'S *new Wooden Block. Plate* 21.

Fig. 3 is a side view, fig. 4 a section, and fig. 5 a front view of the block, with its rope and iron thimble; the same letters of reference applying to all the figures.

A, fig. 4, is a pulley or sheave made of hard wood, and is fast upon its axis B; it has three concentric grooves on each side of it: the axis B, has two pairs of necks or pivots, the larger of which rest and turn upon the two friction wheels C C; whilst the smaller are received into oblong cavities in the brass plates D D, which fit them sideways, but allow them to turn upon the two friction wheels: steel plates, dovetailed at the ends of these cavities, are caused to touch the rounded ends of the axis to prevent its shoulders from producing friction.

The axes of the friction wheels C C, are supported in pivot holes made in the brass plates D, D, and in two other plates E, E; all which four plates are screwed fast to the block by the four screws F, F, F, F.

The block itself is made in two similar pieces, hollowed out to fit the pulley, and joined together by screws G, G, G, (the holes in the wood, above their heads, being closed by plugs), and double dove-tailed plates, one of which is shown at H, fig. 3; and having also apertures on each side of it, one of which is shown at I, fig. 5, in order to screw in the brass plates D, D, and E, E, and which apertures are also afterwards closed by pieces of wood made to fit them, one of which is shown at fig. 6, and screwed by five screws in each.

Eight holes are made through the lower end of the block, four of which are shown in fig. 3, to let the ropes pass through; besides, the two double side orifices, for the same purpose.

Reference to the Engraving of Lieut. M. SHULDHAM'S *New Brass Blocks. Plate* 21.

Fig. 1, is a front elevation of the compound blocks, and double grooved pulley; and figs. 2 and 3, are side views of the same.

A, A, figs. 1 and 2, is a brass block or frame, suspended by the hook B, and having within it a concentric grooved pulley or sheave, C, C, turning upon its axis, D, D; the upper part of the pulley is concealed by the block.

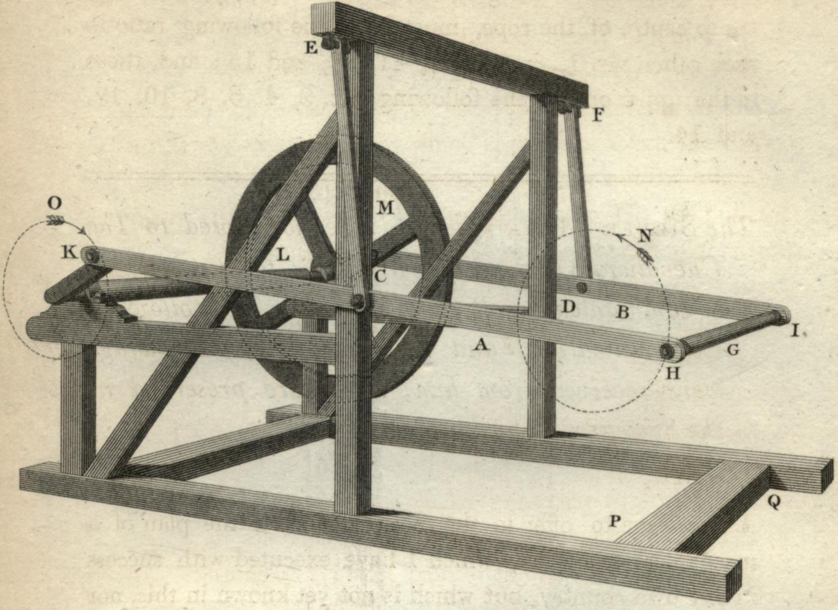
E, fig. 2, is a section of the lower block, similar to the upper one, the inner part of it being made just to clear the projections of the pulley, so as to prevent the ropes from getting out of the proper grooves in it. The block is formed in two similar halves, and is united firmly together by the three screws, F, F, F; a piece of brass, G, G, is secured on each side of the block by two screws, and has, in its centre, a screw of hard steel, H, which is made to touch the convex end of the axis of the pulley in its centre; and the other end being also touched by the opposite screw, H; the pulley is thereby prevented from side shake, or its shoulders from coming into contact with the frame, and thereby causing friction. To the lower block, E, fig. 1, is a weight, I, of sixteen pounds, suspended by the hook, K, and this is kept in equipoise by the weight, L, of one pound only, which is suspended by the two ropes M, M, passing over the double grooved pulley, N, in the block, O.

To rig or reeve these blocks, first make the two ropes fast to the upper block, at P, P, fig. 2; then pass them round the two external or smallest pair of similar grooves in the lower pulley; next round these, in the upper one; then round the second grooves in each pulley; and, so on, till they come to the largest, at Q, fig. 1, from whence they pass over the double grooved pulley, N, in the block, O, and are united to the acting weight, L; and, by being thus doubled, and acting in each side of the pulley alike, they constantly tend to keep it upright; and, besides, the united friction of two small ropes is much less than that of one of double their strength.

N. B. The diameter of the grooves in the pulleys must be calculated from the center of the rope, when put round the pulley; for, as the rope will be flattened a little, in bending round the pulley, when a heavy weight is applied to it, it will, consequently, be less in diameter; and still more so, when the rope becomes flexible.

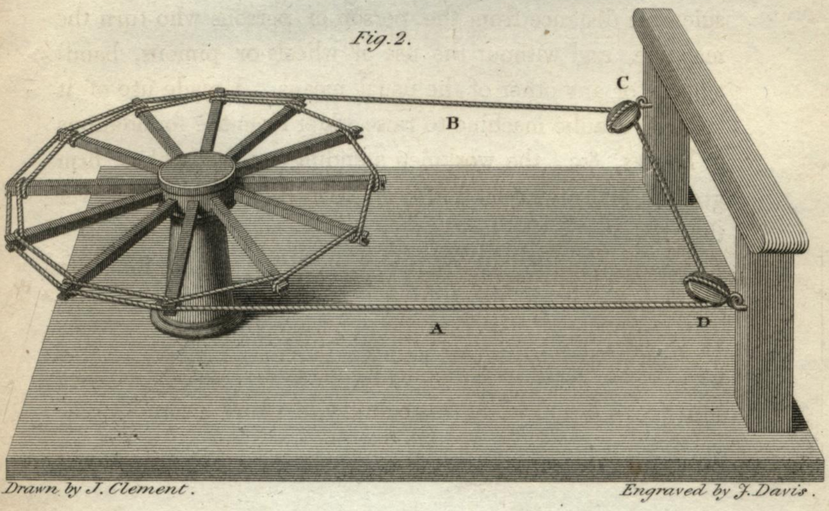
Chev. Baader's Rotary Motion.

Fig. 1.



Lieut. M. Shuldhams Improved Capstan.

Fig. 2.



Drawn by J. Clement.

Engraved by J. Davis.

The diameter of the grooves in the lower pulley, from centre to centre of the rope, must be in the following ratio to each other, viz. 1, 3, 5, 7, 9, 11, 13, and 15; and, those in the upper one, to the following, viz. 2, 4, 6, 8, 10, 12, and 14.

The SILVER MEDAL *was this Session voted to The Chevalier* BAADER, *of Munich, for his method of communicating Rotary Motion. The following Communication, and an explanatory Drawings were received from him, which are preserved in the Society's Repository.*

SIR,

I BEG leave to offer to the Society of Arts the plan of a mechanical invention, which I have executed with success in my own country, but which is not yet known in this, nor published any where.

It is a method of communicating rotary motion to a considerable distance from the person or persons who turn the machine, and without the use of wheels or pinions, band-wheels, or any other of the usual means. I made use of it in an hydraulic machine to raise water from the foundations of houses, &c., the workmen standing on the bank or firm ground, and giving motion to an axis with cranks placed over the water.

I flatter myself, Sir, that this invention will be found so much more worthy of your celebrated and patriotic Society, as its utility is perfectly ascertained by the experience of a number of years in Germany; and, as its application may also prove beneficial to this country in many instances.

I am confident that the mere inspection of the plan will enable your Mechanical Committee to judge of the merit and effect of this invention; but, should it be found necessary, I will, with great pleasure, attend the Committee, to give any verbal explanation that may be required.

I am, with perfect esteem,
Sir,
Your most obedient humble Servant,
JOSEPH DE BAADER, M. D.
Knight of the Kingdom of Bavaria, and of the Order of Merit of the Bavarian Crown: First Counsellor of Mines, and Director General of Hydraulic Constructions to his Majesty the King of Bavaria: Member of the Royal Academy of Sciences at Munich, of the Mineralogical Society of Jena; of the Royal Medical Society at Edinburgh; of the Athenée des Arts, at Paris; and of the Societies for Emulation at Paris, Colmar, and Rouen.

No. 5, Salisbury Street, Strand,
Nov. 8th, 1816.

To C. Taylor, M. D. Sec.

Reference to the Engraving of the Chevalier Baader's *Mode of communicating Rotary Motion. Plate 22.*

The two levers, A B, turning on the centers, C D, of the moveable bars, E F, suspended on their centers, E F, attached to the frame of the machine, having a turning handle, G, which connects their ends, H I, and being attached by cranks to the wheel and axle, K L M, at their other extremities, communicate any rotary motion given to the handle, G, to the wheel and axle, but in a reversed direction, as marked by the arrows, N O ; and this, without the use of wheel-work, band-wheels, &c. as hitherto done.

In the drawing of the machine sent by the Chevalier De Baader to the Society, this contrivance was employed to communicate rotary motion given to the handle G, by labourers standing upon the platform, P Q, of the machine, on the bank of a reservoir, &c. from which water was to be raised, to the wheel and axle, K L M, placed over the water to work pumps, &c. as required. It may also be employed in a great variety of other situations with equal convenience ; as, it is quite immaterial, whether the levers, A B, are suspended from above, as in this instance; below, or even sideways ; and their points of suspension may likewise be varied, when necessary, by a suitable provision in their construction, so as to be placed either nearer to the wheel and axle, in order to act upon them by the handle, G, with greater leverage, to gain power ; or farther from them to gain time; as, the handle G, then moving in a circle of lesser diameter, can consequently be turned more swiftly about.

The SILVER MEDAL, *was this Session voted to Lieut.* M. SHULDHAM, *R. N. of Great Titchfield-Street, for Improvements in Working a Capstan. The following Communication was received from him, and a Model of the Capstan is preserved in the Society's Repository.*

SIR,

I BEG leave to present to the Society a very simple contrivance of mine for applying, with much ease and dispatch, an additional power to a capstan when required. The method has been tried on board his Majesty's brig *Cordelia*, and was found to answer. Many naval officers have also approved it, deeming the contrivance a particular useful one when applied to a ship's capstan.

I have the honour to be,
Sir,
Your obedient humble Servant,
MOLYNEAUX SHULDHAM.

No. 49, Great Titchfield Street, April 9, 1816.

To C. TAYLOR, M. D. SEC.

Copy of a Report of Lieut. George Eyre Powell, First Lieutenant of his Majesty's Brig Cordelia, relative to Lieut. SHULDHAM'S *method of applying more Men to the Capstan.*

"I have had an opportunity of trying your plan on the capstan, it answers in every respect as you stated; indeed, it is too great a purchase, as, yesterday morning, against a strong gale and tide, I clapped on your swifter, and had the pleasure to carry away a seven-and-a-half inch messenger; got the messenger removed to a fresh part, and carried it also away; so you may judge there was no foolish wind or tide. I was afterwards obliged to have recourse to a runner and pendant: the messenger was quite new when we left this place, and had not been used more than five or six times."

(Signed) G. E. Powell, First Lieut.
Brig Cordelia.

Sheerness, Feb. 9, 1816.

To Lieut. Shuldham, &c.

Certificate.

I hereby certify, that I have seen Lieut. Shuldham's contrivance for the application of additional men to a capstan, when it is required to heave a great strain, and have no doubt of its efficacy; and, as it is not attended with any trouble or expence, I think the invention, when known, will certainly be generally adopted, its simplicity and utility being so obvious.

(Signed) A. Brown, Commander, R. N.

April 26th, 1816.

To Lieut. Shuldham, &c.

Reference to the Engraving of Lieut. Shuldham's *improved method of working a Capstan. Plate 22.*

In addition to the usual manner of placing men between the capstan bars, the ends of the bars should have notches or gaps made in them, in which an endless rope, A, B, is received, and passes through two pulley blocks, C, D; thus forming two straight lines, along which men being placed can act by pulling the ropes in the most efficacious manner upon the capstan.

The GOLD ISIS MEDAL *was this Session voted to Mr.* THOMAS PERING, *of Dorset Street, Salisbury-sq. for an Invention called* "The Expeditious Navigator." *The following Communication was received from him on the Subject, and one of the Tables is preserved in the Society's Repository.*

SIR,

I HAVE the honour to lay before the Society of Arts and Sciences an invention under the title of "*The Expeditious Navigator*;" and will, with pleasure, attend for the purpose of giving any elucidation it may require.

I am Sir,

Your most obedient humble Servant,

THOMAS PERING.

No. 117, Dorset Street, Salisbury Square, Nov. 15, 1815.

To C. TAYLOR, M. D. SEC.

SIR.

I HAD the honour to transmit to the Society of Arts and Sciences, on Wednesday last, an attempt to simplify and facilitate the comprehension of the science of navigation, under the title of "*The Expeditious Navigator.*" The short explanation prefixed to it has been considered amply sufficient for those for whose use it is intended; but, as many members of the Society cannot be supposed to be conversant in nautical affairs, I will take the liberty of making a few additional observations on the subject.

It is well known, that a vessel sailing due north or south, makes all latitude; due east or west, all longitude; between any two quarters, both latitude and longitude, according to the course sailed; the two first cases speak for themselves; in the third, recourse must be had to some mode of calculation, of which there are several in use, all of them requiring time, and, as must be the case where many figures are employed, subject to error. The requisite information is obtained by referring to the right hand table, where, by placing the scale on the course sailed, will be seen how much latitude and how much longitude has been made on any given distance; as, in the first example, forty-seven miles on a course of two points and a quarter gives forty-two and a half of latitude, and twenty of *apparent* longitude, by seamen termed *departure*. It remains to find how much *actual* or geographical longitude is contained in the apparent longitude, which has been just ascertained; for, inasmuch as the degrees of longitude, narrow as we approach the poles, it follows that the longitude varies according to the distance from the equator; for this purpose, a fresh calculation must be resorted to, the necessity for which is obviated by the left hand table, when the longitude being geographically marked out according to the figure of the globe, I have only to place my scale on the degree of latitude in which I have been sailing to find the actual longitude comprised in the apparent longitude or departure, which has been just ascertained ; as, in the second example, twenty miles of apparent longitude or departure in latitude sixty, gives forty miles of real or geographical longitude. On the same principles, and with equal facility by these tables alone, all the ordinary business of navigation may be performed.

Should my invention be honoured by the favourable opinion of the Society, I shall feel duly sensible of any mark of their approbation of which it may be considered to be deserving.

I have the honour to be,
Sir,
Your most obedient Servant,
THOMAS PERING.

No. 117, Dorset Street, Salisbury Square, Nov. 20, 1815.

To C. Taylor, M. D. Sec.

DEAR SIR,

From the rough plates I have seen of your improved navigator, and the mode of applying it, I have no hesitation in saying it is a most material improvement in that art, for, exclusive of its simple construction and ease of comprehension, I consider any mode hitherto not used that may tend to the correcting of the longitude of the greatest use, as all nautical instruments are liable to accident, and observations we know are uncertain; and, next to the time-piece, this is the neatest mode I am aware of.

I am, dear Sir,
Your very faithful Servant,
PHILIP BROWNE.

Leamington, Nov. 22, 1815.
To C. TAYLOR, M. D. SEC.

I should have deemed it equal to the time-piece, if on a brass plate.

CAPTAIN HURD conceives the invention of MR. PERING to be so highly useful and necessary to navigators, as to deserve all manner of encouragement; and therefore means to recommend its adoption and use to all his naval friends, and others who have occasion to traverse the ocean.

Hydrographical Office, Admiralty, Nov. 25, 1815.
To C. TAYLOR, M.D. SEC.

DEAR SIR,

I HAVE examined your expeditious navigator with great pleasure, and it appears to me to be an invention which, from its simplicity and ingenuity, is likely to be found of great utility.

I shall be happy in giving it all the publicity and recommendation in my power, and which I conceive it so richly merits. Wishing every success to your undertaking, which I shall be happy to promote, I am,

Dear Sir, Yours, most truly,
H. SNOW,
Superintendant Harbour Master of the Port.

Harbour Office, Tower Precinct, Nov. 28, 1815.
To Mr. T. PERING, &c.

DEAR SIR,

YOUR brother has shown me your ready navigator, and I congratulate you on your happy ingenuity. It is a very pretty improvement upon the French "*Quart du Cercle*," whereby day's works at sea may be worked with great readiness and simplicity.

I am, dear Sir,
Yours, very sincerely,
M. MALLIDAY.

Penzance, Nov. 27, 1815.

TO T. PERING, Esq.

SIR,

I WAS much gratified on receiving your brother's scale, the *Expeditious Navigator*, for inspection. It has brought the dead reckoning to such a short, simple, and accurate method, I have no doubt but it will be approved of by *all* classes of navigators. I will thank you to forward me a copy as soon as convenient.

I am, Sir, Yours, &c.
CHARLES GIDDY, Commander.

Penzance, Nov. 27, 1815.

To Mr. A. PERING, &c.

SIR,

I HAVE much pleasure in stating my opinion, that your invention of a table for the computation of day's works at sea, will be most useful; and that I hope to understand very soon it is in general use on board ships, on long as well as short voyages.

I am, Sir,
Your most obedient Servant,

J. BOULDERSON.

East India House, Nov. 25, 1815.

To T. PERING, Esq.

SIR,

YOUR invention for facilitating the computation of days-works at sea, I consider a useful auxiliary on ship-board, and more particularly to young navigators, or to those who are not expert at logarithmetic calculations; and consequently worthy the countenance of the public.

I am, Sir,
Your most obedient servant,
JAMES HORSBURG.

East India House, November 25, 1813.

To T. PERING, Esq.

⁂ It will not be irrelevant to the subject here to observe, that, though the Society, on all occasions, are extremely anxious to convey to the public, in as clear and concise a manner as possible, the nature and utility of the different inventions they reward, they nevertheless do not *always* accompany the description with an engraving. There are cases in which the Society consider a written communication perfectly elucidatory of the subject, and there are others, *particularly when an engraving of an invention has been previously published*, when they do not deem a descriptive plate necessary. The papers accompanying Mr. PERING's invention, are so satisfactory, and so much evince the utility of his "*Expeditious Navigator*," that the Society have dispensed with an engraving;—a circumstance, which, they are inclined to think, will not be regretted, when it is known that the tables are published on a larger scale than *they* could have embraced, by Mr. Carey, Map-seller, in the Strand.

The GOLD ISIS MEDAL *was this Session voted to Mr.* JAMES ALLAN, *of Blewitt's Buildings, Fetter Lane, for a Theodolite. The following Communication was received from him on the Subject, and a Model of the Apparatus is preserved in the Society's Repository.*

SIR,

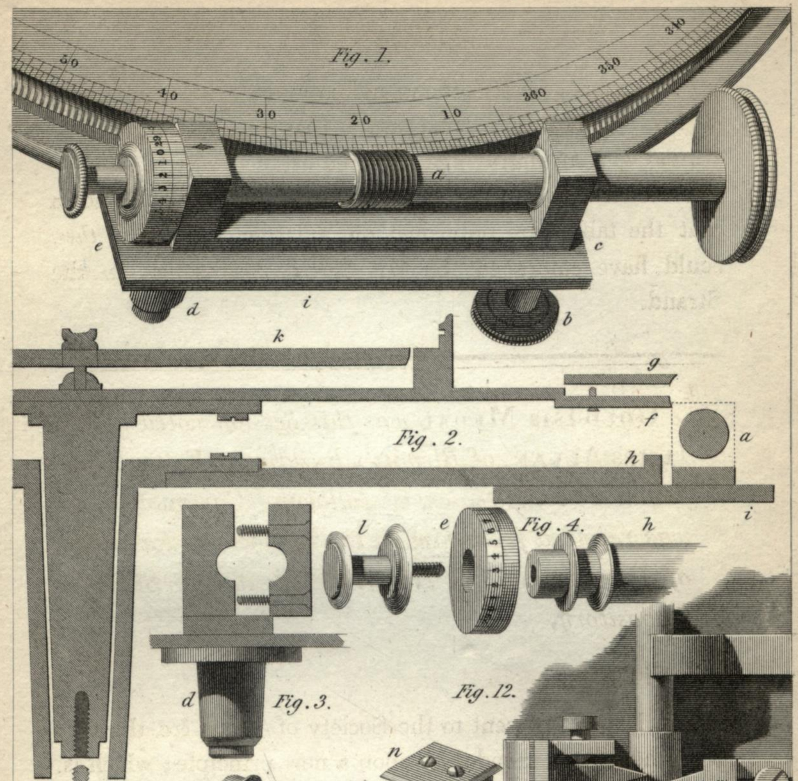
I BEG leave to present to the Society of Arts, &c. through your medium, a theodolite upon a new principle; which is, instead of reading the divisions by a nonius or vernier, they are read by a micrometer; which method, I believe, will be found to facilitate the reading the divisions more accurately.

I am, Sir,
Your obedient Servant,
JAMES ALLAN.

Blewitt's Buildings, April 24, 1816.

TO C. TAYLOR, M. D. SEC.

Mr. Jas. Allan's Theodolite, & Machine for Cutting of Screws.

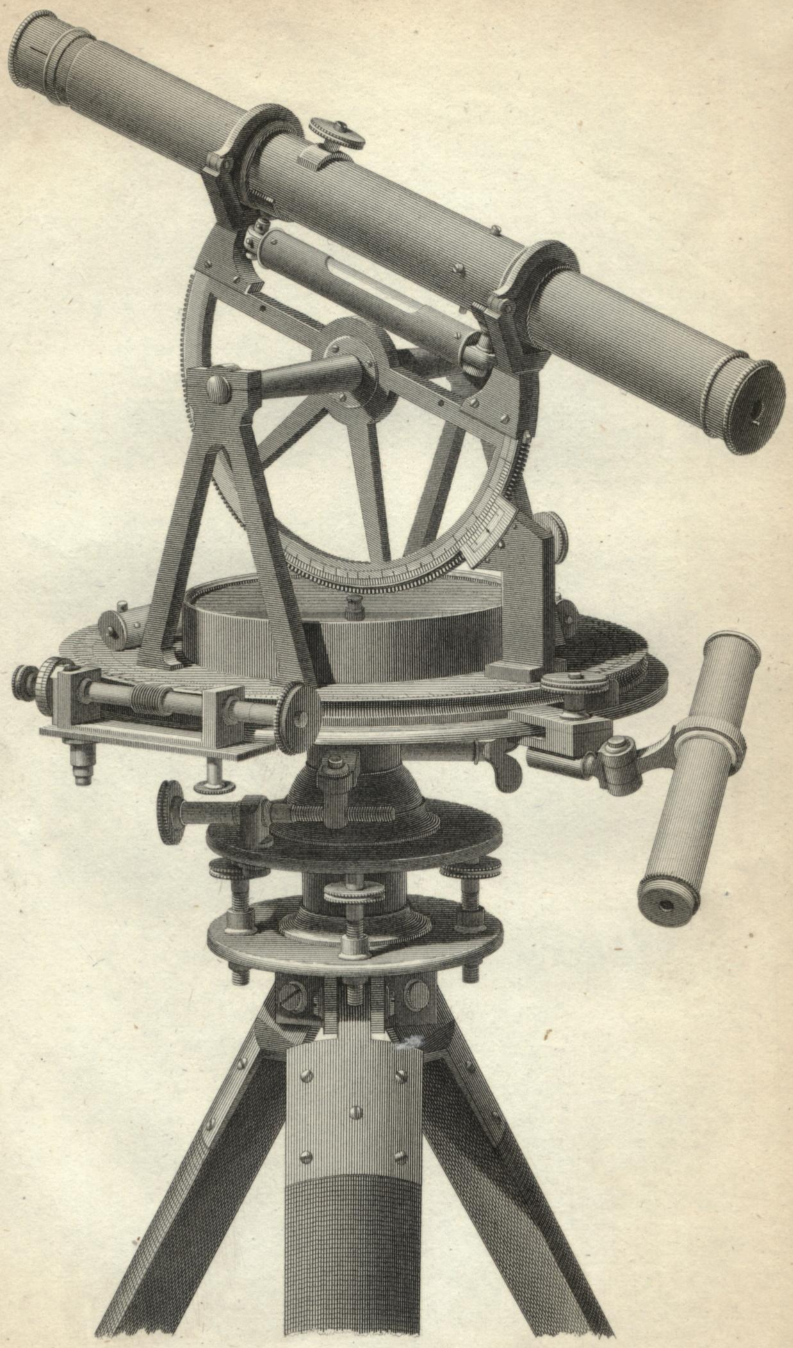


Drawn by C. Varley.

Engraved by C. Armstrong.

Pl. 24. Vol. 34.

Mr. James Allan's Theodolite.



Drawn by J. Clement.

Engraved by C. Armstrong.

The Silver Isis Medal *was this Session voted to Mr.* James Allan, *of Blewitt's Buildings, Fetter Lane, for his method of making Screws for mathematical Purposes. The following Communications were received from him, and a Model of the Machine is preserved in the Society's Repository.*

SIR,

I beg leave to inform you, that I have invented a simple and easy method of producing a correct screw, which I wish, through you, to submit to the Society of Arts, &c. I will do myself the honour to attend the Committee with the tool to-morrow evening, when, if permitted, I will cut a correct screw in their presence.

I have the honour to be,
Sir,
Your obedient Servant,
JAMES ALLAN.

Blewitt's Buildings, Fetter Lane, Jan. 22, 1816.

To C. Taylor, M. D. Sec.

SIR,

I beg you will permit me to inform you, that I intend, with permission of the gentlemen of the Committee, to perform my promise next Thursday evening: I mean to cut a correct screw in their presence.

I have found that it is necessary to have two dies or cutters;

the one to be larger in diameter than the other; the largest is the one proper to begin with, which should be sufficiently large to receive and fit, at the beginning, the part that is to be cut; if so, the very first turn is sure to form a proper screw. The whole of the teeth in this case will be in contact at once with the part that is to be cut. I would, however, finish with the second, and in case there should be any difference in the bearings, with respect to size, I would recommend to shift or reverse the screw in finishing; by which means the error, however little, will be split, and consequently a screw, as near perfection as imaginable, cannot fail to be produced.

The method is so simple, that it does not seem to be of much importance. Nevertheless, I beg leave to observe, that it is a well-known fact that a true screw is considered a very important thing, especially among many branches of mechanics, particularly if obtained, as in the present instance, with little trouble.

About twenty years back, I was with the late Mr. Fairbone. My work was mounting on a stand telescope of five and seven feet long: each stand had two screws, similar to what I cut with this tool; the one to give the telescope horizontal motion, and the other the vertical. I found, however, great difficulty in cutting the screws in common dies. I could not get them free of two faults; one of which was, that I could not get the thread to be of a true regular inclination; the other was, that in consequence of the force necessary to cut a screw in dies or screw-plate, they were sure to get bent and twisted. I never, therefore, could get them sufficiently true to their bearings, so as to act truly pleasant. These reasons, at that period, made me suggest the tool that I now submit to your consideration. The present Mr.

Fairbone approves much of the method, and requested me to make a tool for him.

I have finished a new kind of theodolite, about eight inches in diameter; it is cut in the edge with a screw of this size into seven hundred and twenty teeth; each turn of the screw will be half a degree, so that a head, or what is called a micrometer, divided into a hundred and twenty divisions, will show quarter minutes. I shall be sure to get the teeth truly in their proper places by the correcting ring, similar to that on the dividing engine; for which I received the Society's Gold Medal.

The Screw I cannot have any doubt of getting properly true by the tool, and thereby will be able to show the quarter minutes by the micrometer instead of nonius. I also can divide it on its own axis by itself, by which means it will be pleasant to use, and more correct than theodolites hitherto in use.

I have mentioned my improvement to several surveyors, who think well of it, and are anxious to see it finished.

I am, Sir,
Your humble and obedient Servant,

JAMES ALLAN.

Blewitt's Buildings, Jan. 30, 1816.

To C. Taylor, M.D. Sec.

N.B. I should not have noticed the theodolite in this letter, but that it is inseparable from the screw.

SIR,

I have to beg your pardon for claiming your attention to the subject of screw-making once more.

I have

I have already said, that it is a simple and easy method to get a good screw. Any one, who works on metal, can make the tool, the expences of which will not come to more than common stocks and dies. It does not only make the screw true in itself and to its bearings, but it affords an opportunity of making a screw of considerable length proportionably true, that is, each thread shall be in its proper place. This is to be done by dividing it, and beginning to cut at different stations the same as beginning to cut the teeth of a dividing engine, which I should like to show the gentlemen of the Committee on Thursday evening. I would however observe, that the greatest and best of all purposes that a screw can be applied to, is the mathematical dividing engine, and it requires but a short screw, such as this tool can make. The engine or tool that the late Mr. Ramsden made, to cut the screw of his dividing engine, I think would now cost little less than fifty guineas to make, and then it would be a short screw that it makes, such as my tool on a larger scale can make. The experience I have had for several years in dividing mathematical instruments, gives me sufficient confidence of the truth of the screw of my engine that was made on this way or principle, that I would be bound to do every thing with my screw, in point of accuracy, that can be done by the late Mr. Ramsden's screw. The utility of the tool does not end here: I believe it will be found to be the best hitherto in use for making the adjusting screws for astronomical instruments. Mr. Dollond has seen and approves it: Mr. Jones, from the late Mr. Ramsden's, considers it new and useful: Mr. B. Stancliffe, late apprentice to, and nephew and successor to Mr. John Stancliffe, likewise approves it: he thinks that it may be applied to the making of adjusting screws for mathematical purposes with advantage, in a variety of instances: Mr. Bacon considers it an improvement; as likewise does Mr. Swygart.

All that I shall add is, that I believe there is no method that is attended with so little difficulty, or so cheap as mine, and likely, at the same time, to produce so good a screw. Should there be any, on producing it, I will withdraw my claim.

I have the honour to be, Sir,
Your obedient Servant,
JAMES ALLAN.

Blewitt's Buildings, Feb. 5, 1816.
To C. TAYLOR, M.D. SEC.

Reference to the Engravings of Mr. JAMES ALLAN's *Theodolite, and Machine for cutting Screws. Plate* 23 & 24.

Fig. 1, part of the theodolite, divided to half degrees, showing the endless screw, *a*, clamped close in: *b*, the screw that fastens it, by loosening which it is disengaged; the screw-frame then moves freely on the axis, *d*, on which it turns. The theodolite is divided into half degrees; the edge is cut into as many (720) threads, consequently one revolution of the screw moves the theodolite half a degree: *e*, a micrometer on the screw *a*, divided into thirty, which gives minutes, and these subdivided into four, give quarter minutes.

Fig. 2, a section of the circle, the parts a little separated to show the construction; the rack in the edge is parted in the middle: the upper half, *g*, is a ring screwed to it, with twelve screws, thirty degrees apart. *h*, the rim of the under plate, on which the circle moves: *i*, the plate, carrying the screw-frame: *a*, a section of the screw: *k*, the needle.

Fig. 3, part of the screw frame, showing the split head for holding the screw, and the axis, *d*, on which the frame moves.

Fig. 4, the screw end, with the micrometer, *e*, taken off: *b*, the small screw, which fixes the micrometer when adjusted.

Fig. 5, a frame for cutting screws: *n*, the stock, which holds the cutter or half die, *m*: *o*, *o*, two chaps, which hold the cylinder to be cut; they are fastened to a plate which slides in the dove-tail, *p*, *p*, *p*, *p*: *q*, the screw which forces the cylinder against the cutter.

The cutters are originally tapped in their place, consequently true to the chaps. The tap being made similar to the screw, *a*, which is being cut in the chaps, a small winch is to be put on the square end, *r*, to turn it round in the chaps: *o*, *o*, must be apart full twice the length of the screw to be cut; two cutters are used to cut the screw: the cutter, fig. 6. is first put in; the outer dotted circle is the diameter of the cylinder or top of the thread; the inner dotted circle is the bottom of the thread: this first fits the outside diameter of the cylinder, by which it gives a true lead: when this has cut a quarter or a third down it is taken out, and fig. 7, is put in, which fits the bottom of the thread, (as shown by the dotted circle.) Though the cutters (being made in their place) are sure to give a true cylindrical screw; yet, if the end moving in one chap, is bigger than the other, it will give a screw taper the contrary way; therefore they *must* be of the same size; and, if there should be any fault in the cutter when the screw is cut, passing it once through the contrary way will equalize it, and the thread must then be perpendicular to the axis, and perfectly concentric.

Fig. 8, a top view of the stock, *n*, and cutter, *m*.

Fig. 9, a side view of the frame.

The above only shows its application to set screws for common use, but it also generates original screws perfectly true, of any number of threads, and right or left-handed. In this case, the stock and cutter are made as fig. 10, and fig. 11: the back of the stock is made into the segment of a circle, *s*; and the top of the cutter is continued into an index, *t*; the cutter is a single thread, and moves on its edge, *v*, as a centre: this must fit true, and the stock fit close to the cutter to keep it perfectly steady: *u*, *u*, two screws, to adjust and fasten the cutter to any required angle; the cutter should be rather elliptical, for it is best to fit well to the cylinder at the greatest angle it will ever be used. When one turn has been given to the cylinder, fig. 12, a tooth, *w*, is put into the cut, and screwed fast; this tooth secures the lead, and causes every following thread to be a repetition of the first; and, though it might do without, yet this is a satisfactory security.

The SILVER MEDAL *and* FIFTEEN GUINEAS *were this Session voted to the Rev.* JAMES BREMNER, *of the Shetland Islands, for a Night Telegraph. The following Communications were received from him on the Subject.*

SIR,

VARIOUS plans have been devised, by means of which telegraphic communications may be conveyed by day to places very distant from one another; but no method has hitherto been invented by which a single word, much less a distinct sentence, can be telegraphically communicated by night, to the distance of even one single mile.

Polybius makes mention of an invention somewhat to this effect, by means of what is called πυρσειαι, which clearly signifies signals by fires, (not by lights,) and probably was no other than what has been common in all ages and countries, *i. e.* by raising large fires on the most conspicuous eminences, to give notice of an approaching enemy, to summon to arms, or to indicate the place of rendezvous, &c.

Mention is likewise made of the number used, as from one to seven. Numbers no doubt would serve to multiply and diversify the intelligence, but still they would be only so many arbitrary signals for special purposes previously concerted; nor, is there any reason to believe, either from their nature or number, that any communication properly telegraphic, could ever have been effected by them.

As a telegraph which could operate by night might be equally useful as one by day, it must naturally have occurred to those who invented the one, to think and consider how the same thing might be done as to the other, but none such existing, it appears that every attempt to invent a night telegraph has hitherto proved abortive.

Having discovered a plan perfectly adequate to the purpose, and presuming to think that the communication of it will not be unacceptable to a society whose primary principle is to patronize and promote every effort which has a tendency to advance scientific knowledge, or which may conduce towards improvement in any art, I humbly beg leave to submit it to their consideration.

One single light constitutes the whole apparatus; and the whole operation consists in alternate exhibition and occultation of that light.

The further explanation is as follows:

Whenever any communication is to be given, the informant shows his light, and waits till the respondent shows his in return; and, having done so for a few seconds, he then retires it in token that he is ready to observe the informant's motions.

But, previous to any operation, the following plan must have been concerted and settled between the parties. The alphabet, according to the order in which it commonly stands, is to be divided into four parts, to be called the first, second, third, and fourth divisions, thus:

First division	*a*,	*b*,	*c*,	*d*,	*e*,	*f*,
Second division	*g*,	*h*,	*i*,	*k*,	*l*,	*m*,
Third division	*n*,	*o*,	*p*,	*q*,	*r*,	*s*,
Fourth division	*t*,	*u*,	*v*,	*w*	*x*,	*y*.

In the next place, the letter in each division is to have its corresponding number marked below it, thus:

First division	*a*,	*b*,	*c*,	*d*,	*e*,	*f*.
	1,	2,	3,	4,	5,	6.
Second division	*g*,	*h*,	*i*,	*k*,	*l*,	*m*.
	1,	2,	3,	4,	5,	6.

Each of the remaining two divisions to be numbered in the same manner.

The light is to be obscured or darkened by interposing before it a thin board or screen, or otherwise, so as to cover it from the view of the respondent; and every such obscuration is to count one, two obscurations count two, and three obscurations count three, &c.

The use of these obscurations, according to the number made, as one, two, three, or four, serve to indicate which of the four divisions is referred to, and intimates, that the letter to be taken down will be found in the division which has been pointed out: example—If two obscurations had been made, (a pause following,) it would indicate the second division. If four obscurations had been made, it would indicate the fourth division.

This is the first half of the operation.

The next consists in pointing out the particular letter by so many obscurations as correspond thereto, as one if for the first letter in the division, three if for the third, and six if for the last, &c.

There can only be four obscurations for the division, but there may be six for the particular letter in any given division.

The time allowed for each obscuration is about one second, and for the pause (where it should be marked) about double that time. The first pause which marks the division need not be long; it is sufficient if it can be distinctly observable: but the second pause, indicating the particular letter, ought to be long enough to allow time for noting down the letter given.

Thus, the whole operation consists in first marking out the division, and next in marking out the particular letter in the division which had been given.

This can be easily and correctly done by a single person either giving or receiving a communication, if he will only take the trouble of committing to memory the letter and its number in each division.

But it may still be more easily performed by employing two persons on each side.

Of these two persons the business of the one is merely to count the number of the motions made on the light, and to report that number; and the sole business of the other is to mark down the letter agreeably to the report.

Thus the observer of the motions having counted them, and finding there were three, he pronounces aloud three; when, he who holds the pen with his alphabet before him, lays his finger upon the third division, and waits; suppose, then, the next report to be five, this he sees to be the letter *r*, and so writes it down, *r* being the fifth letter in the third division.

Thus, the business is made the easiest thing in the world, requiring neither memory nor recollection, but only that the one can count correctly four for the division, and six for the letter; and, that the other can note down the letter to which he has been directed.

Where two persons are employed on one side, the distinction of a coloured light for the division, a white one for the letter would be quite superfluous. At any rate, two could only be correctly managed at the distance of only a few miles; but, at the distance of from twelve to twenty miles, if they were not thirty feet asunder, they would appear as one.

It must be obvious to the slightest reflection, that the use of spy-glasses would lead to endless errors.

I used only one single lamp and reflector, being one of those in the light-house on Copeland island, and its exhibitions were correctly taken by the naked eye at Portpatrick, in Scotland, without missing or mistaking a single letter. Had any enemy landed in Ireland, I could, in defiance of wind and weather, have sent correct intelligence across the Irish sea every night, and ten times in a night, if necessary, to inform of their numbers, strength, situation, motions, &c.

A little experience suggested some very useful rules. In the first place, whatever is to be communicated ought to be written down in as few words as can be consistent with the clear and distinct meaning.

It was considered that it was possible some error might be made, and made on the most essential word in the whole sentence; and, if the whole had been given in continuation, there might be a necessity for going over the whole again.

This would have been a very aukward circumstance; but, to remedy this compleatly, a sign was settled upon that would indicate when every single word was finished; this sign is given by making a few rapid motions very easily to be distinguished from the ordinary regular motions made in seconds. The respondent had then to look and see if he had got a distinct word, and if he had, his acquiescence showed that all was right; but, if it happened otherwise, he was instantly to produce his light, which implied, that the word so challenged must be repeated: thus, any error was instantly detected, and immediately rectified, without affecting any other part of the communication. But, the communications from Copeland island to Portpatrick, though they consisted of many hundred motions, not the error of a single letter was made either in giving or receiving them.

If the whole alphabet were to be used, sixty letters might easily be given in five minutes; and certainly it would require no extraordinary address to comprize some important intelligence in sixty letters; but the process would be greatly abridged by using only sixteen letters, in place of twenty-four, and these sixteen will serve every purpose that any greater number can do.

I am, Sir, with respect,

Your obedient Servant,

JAMES BREMNER.

No. 8, Macclesfield Street, Soho.

To C. Taylor, M.D. Sec.

Additional

Additional Communications respecting the Rev. JAMES BREMNER'S *Telegraphs.*

SIR,

As I am extremely solicitous (as some mark of both my respect and gratitude) to render any thing which I have the honour to submit to the Society of Arts, &c. as far worthy of their notice as lies in my power, I have thought of some improvement which might be made both on the day and also on the night telegraph; and, I consider it as my duty to submit what has occurred to me on both these points, that the Society may add them, or not, as they shall judge proper, to what I have already stated.

With respect to the day telegraph, which is adapted to an alphabet of sixteen letters only, some may think so many substitutions of one letter for two would be inconvenient and troublesome: In order to remove this objection, a fifth division may be added, (as I think I have already suggested,) to the division side of the telegraph, by means of a particular sign indicating this fifth division.

This sign might be given by bringing a cover over the division part, so that no light would at all appear on that side. To effect this, a Venetian blind might be dropped from above the division side; or, by drawing up from below, a small frame covered with any thin cloth: this last appears to be the most simple, as requiring only one movement in pulling it up, as, when left at liberty, it would, by its own weight, immediately replace itself. The letter side would undergo no change whatever, but would indicate any letter in the fifth division in the same manner as of any other.

Upon this plan there would be five divisions, and four letters to each division, thus,

First division	*a*,	*b*,	*c*,	*d*;
			k,	*t*,
Second division	*e*,	*f*,	*g*,	*h*;
Third division	*i*,	*l*,	*m*,	*n*;
	y,			
Fourth division	*o*,	*p*,	*q*,	*r*,
Fifth division	*s*,	*u*,	*v*,	*x*.

The letter *z*, seldom occurs, but, whenever it does, the letter *s*, may be substituted for it, to which it is so nearly allied, that the most scrupulous can hardly object to it.

The foregoing alphabet of twenty letters is so ample, that whoever understands any alphabet at all, must deem it perfectly sufficient for every purpose.

Upon the same plan and arrangement of the alphabet the night telegraph may be used.

There will be five obscurations to show the division, and only four obscurations to point out the letter in the last division given; and, whilst it will be equally correct and distinct, it will shorten the operation one sixth part. If there be one more obscuration in the division, there will be two less in showing the letter, and being a middle course between the longest and the shortest alphabets, may be thought the best.

As it is of some consequence to know when a word is ended, this might be indicated by two or three obscurations, made by the blind in rapid succession.

There are only two single letters which constitute a word, viz. *a*, and *j*, and it would be material to mark them as such by the same sign as marks the end of any other word.

I am, Sir,
Your obedient Servant,
JAMES BREMNER.

No. 8, Macclesfield Street, Soho.

To C. Taylor, M.D. Sec.

DEAR SIR,

I have received both your letters of the 2nd current. The one informing me, that, for my plan of a day telegraph, the Society had been pleased to honour me with their Silver Medal, and a bounty of Ten Guineas; the other informing me, that the Society had, for my night telegraph, voted me their Gold Isis Medal, or their Silver Medal and Fifteen Guineas, at my option.

I hereby beg leave to signify, that, as the Society has been pleased to give me the option, it will be most agreeable to me to prefer the latter.

I observe, in the Society's regulations, they have made an exception in favour of those who are about to leave the kingdom. It is true I do not fall within that exception, but my situation in the Orkney islands, to which I am presently to return, deprives me of any communication with London, (excepting by post,) as much as if I were in the West Indies: I may say even more so, for there they have regular posts; but there is nothing of this kind between London and the Orkneys.

It was not till two years, therefore, that I received the Society's Medal, in 1809; and, the volume which had been delivered with it, I have never yet seen.

If the Society shall be pleased to consider my case as coming within the line of their intended indulgence, it will be adding much to my former obligations, which it will be my pride and my pleasure gratefully to acknowledge as long as I live. If you will have the goodness to represent the above to the Society, you will much oblige,

Dear Sir,

Your most obedient Servant,

JAMES BREMNER.

No. 8, Macclesfield Street, Soho,
March 4th, 1816.

TO C. TAYLOR, M. D. SEC.

The SILVER MEDAL *and* TEN GUINEAS *were this Session voted to the Rev.* JAMES BREMNER, *of the Shetland Islands, for a Day Telegraph. The following Communications were received from him, and a Model is preserved in the Society's Repository.*

SIR,

I HEREWITH send you a model of a telegraph, which, in my humble opinion, will be found superior to any thing of the kind hitherto invented. It is simple in construction, and expeditious in its operation.

I embrace this opportunity of expressing the very grateful sense I shall ever have of the great honour and favour which the Society of Arts, &c. were pleased to confer upon me some six years ago for my life-boat plan; and, if they will now permit me to wait upon them, I shall be ready to attend

tend at any time they may be pleased to appoint, that I may then exhibit practically the manner in which the telegraph is to be used.

I should be happy to submit also to their consideration, the plan of a night telegraph, which will operate at once to the distance of twenty miles and upwards. If you will have the goodness to present the model, and to favour me with an answer, you will much oblige,

Sir,

Your most obedient Servant,

JAMES BREMNER.

No. 8, Macclesfield Street, Soho.

To C. TAYLOR, M.D. SEC.

DEAR SIR,

I BEG leave to offer my best thanks for your attention in bringing to the Society's notice the plan and model of my day telegraph.

I should have noted particularly, that I had purposely omitted to attach winches to the squares below, by means of which the machine, upon a proper scale, is to be wrought; but, as in the model, it is only cat-gut, which is sufficient for the purpose of showing its mode of operation, the purchase of a winch might easily snap the cat-gut, of which there could be no danger where there was an iron chain.

The circular plates admit of somewhat more than one complete revolution—one revolution being all that is necessary, as it equally revolves either way, and consequently can in a moment be put into any position required.

I had a sketch of the plan of my night telegraph ready to lay before the Committee; but they informed me that it would not be agreeable to their rules to take notice of it unless it came before them by the appointment of the Society. I have therefore to request you to have the goodness to offer the enclosed sketch to the Society's consideration; and, if they shall be pleased to refer it to their Committee, I shall be happy to wait upon them, in order that I may exhibit the practical application of my plan.

I am, respectfully,
Dear Sir,
Your much obliged and obedient Servant,

JAMES BREMNER.

No. 8, Macclesfield Street, Soho,
January 30th, 1816.

To C. Taylor, M.D. Sec.

Description and Explanation of a new Telegraph.

This telegraph has two circular compartments in front; and, within side of each of these compartments, there is a circular plate moveable round its center. One half of the plate is a solid semi-circle; the other half is quite open, that light may be seen through it.

On the axis of each of these plates there is a small cylinder; and, at a convenient distance below, there are on their axes two corresponding cylinders of the same diameters as those on the axis of the plates above; and, to the cylinder a chain is attached, connected with its corresponding cylinder below.

The cylinders below are turned each by a winch, which revolution causes the plate to revolve or rest in any position required. The chain admits of only one revolution, but makes that revolution alternately forwards and backwards.

As a preparatory step, the alphabet is to be divided into four parts, thus:

First division	*a*,	*b*,	*c*,	*d*,	*e*,	*f*,
Second division	*g*,	*h*,	*i*,	*k*,	*l*,	*m*,
Third division	*n*,	*o*,	*p*,	*q*,	*r*,	*s*,
Fourth division	*t*,	*u*,	*v*,	*w*,	*x*,	*y*.

The light or open side of the moveable circle is to be the chief object of attention, as it is by the position of it that the meaning is conveyed, and the explanation of one compartment is equally applicable to both. The moveable circle is to have only four positions, viz. two horizontal and two perpendicular, corresponding to the four sides of the square frame, as represented in the Engraving, which show the four different positions into which the light or open semicircle is to be turned; and the position, with its corresponding number annexed, indicates the division of the alphabet referred to. If the light side stands as in the first figure, it will indicate the first division; but, if it stands as in the second figure, it will indicate the second division; and so as to the other two.

The position of the other open semicircle on the right hand side indicates, in the same manner, the number of the letter in the division designated by that on the left; and the position of both indices may simultaneously be changed in a moment, and the letters may be dictated almost as quickly as they can be noted down.

As there are only four divisions, and four letters in each division, there can only be sixteen letters in the alphabet used, as was the case with the first French telegraph.

For this purpose, an abridged alphabet must be previously settled and agreed upon, in some such form as this, viz.

a, b, c, d, e, f, g, h, i, l, m, n, o, r, s, u,
p, k, t, y, x,
q.

Here the letter *b* is to stand for *b*, or for *p*; the letter *c* for *k*, or *q*; the letter *d* for *d*, or *t*; the letter *i* for *i*, or *y*; the letter *s* for *s*, or for *x*; and the letter *u* for *v* and *w*.

If the above was to be adopted, then the four divisions of the telegraphic alphabet would stand thus;

First division	*a*,	*b*,	*c*,	*d*,
Second division	*e*,	*f*,	*g*,	*h*,
Third division	*i*,	*l*,	*m*,	*n*,
Fourth division	*o*,	*r*,	*s*,	*u*,

If it were thought necessary to have four letters more in the alphabet, it would be easy to contrive a sign for a fifth division, whilst the compartment for indicating the number of the letter in the division would, without any alteration, designate each of the four additional letters in the same way as before.

Reference to the Engraving of the Rev. JAMES BREMNER'S *Day Telegraph. Plate* 25.

This telegraph has two circular compartments or apertures; in each of which is a semicircular black plate of metal, revolving upon its centre. On the axis of each of these plates is a small cylinder or pulley, and, at a convenient distance below, there are corresponding cylinders of the same diameter, moving upon their axes, and connected to the upper ones by chains, (see fig. 5;) the lower cylinders are turned with winches,

Pl 25

Mr. James Braby's Fire Escape.

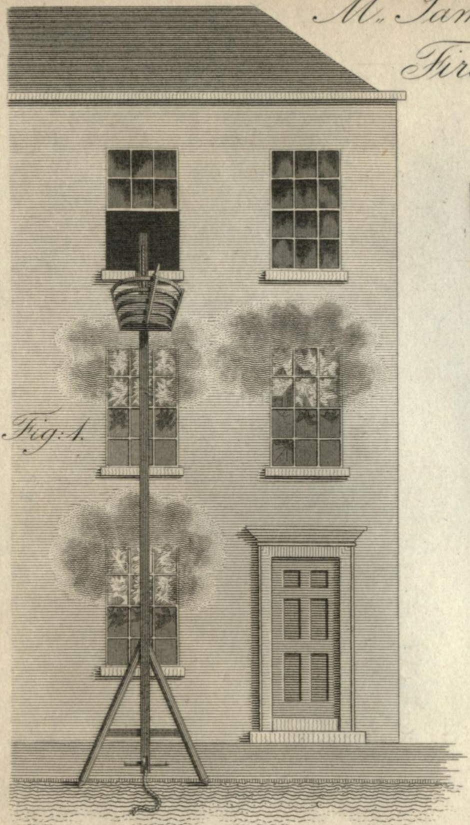


Fig: 1.

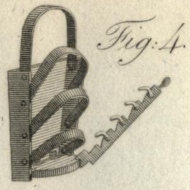


Fig: 4.

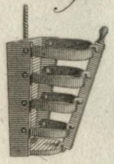


Fig: 3.

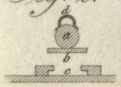


Fig: 2.

The Revd. Jas. Bremner's Day Telegraph.

Fig: 5.

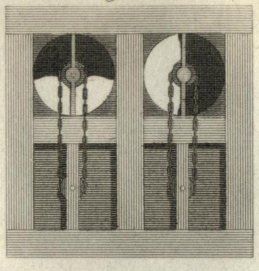


Fig: 6.

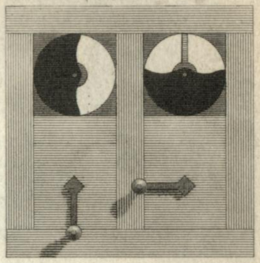
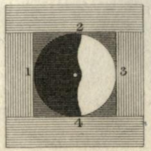


Fig: 7.



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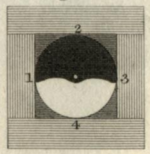


Fig: 9.

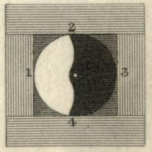
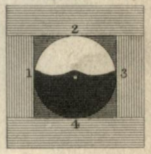


Fig: 10.



W. Newton Del.

J. Bacon sculp.

winchs, (see fig. 6,) which, by their revolution, cause the plates above to revolve into any of the four positions represented in the engraving.

The SILVER MEDAL *was this Session voted to Mr.* JAMES BRABY, *of Vine Street, Narrow Wall, Lambeth, for a Fire Escape. The following Communication was received from him, and a Model of the Machine is preserved in the Society's Repository.*

SIR,

HAVING attended the Society's Committee of Mechanics on Thursday last, when a kind of folding ladder for assisting persons in escaping from fire was introduced, I conceived it to be a very general opinion that nothing had been invented for external aid in cases of persons being in danger of perishing by that destructive element, that was, upon the whole, better than a common ladder. It struck me at that time, that there would be great difficulty in rescuing women or children, aged or infirm individuals, from the upper stories by *that means*, in that moment of terror and fright which must be always the case when the house is on fire. I therefore considered, that, if a light simple machine could be constructed that would obviate these difficulties, it would be a valuable acquisition, and particularly in this great metropolis. It is with the view of adding my mite to the general good that I have made the model which you will receive herewith, and which, I believe, if made of the full length and strength required for use, would be considerably *lighter*, and could be raised with greater ease and facility than a common ladder: I consider that women, children, aged, and even sick people might descend on it from the upper stories of a house on fire with *ease* and *safety*; and, I think I may venture to say, (as far as I can judge from the action of the model,) that it will be of essential service to the Insurance Companies, as property of almost any description might be saved by it from the upper part of houses on fire, without damaging it, and a fire-man might ascend and descend on it with greater facility than on a ladder. As your Committees are composed of men of the greatest science and ability, I am confident, should the invention appear to them to have any merit, that it will be duly appreciated; and, if it should be the means of saving one fellow-creature, and prevent the bystanders witnessing the horrid sight of a neighbour, friend, or relative perishing in the ruins of his burning habitation, it will be highly gratifying to, Sir,

Your most obedient humble Servant,

JAMES BRABY.

Vine Street, Narrow Wall, Lambeth,
Feb. 14th, 1816.

To C. Taylor, M.D. Sec.

Reference to Mr. James Braby's *Fire Escape. Plate* 25.

The application of this contrivance to the purposes of effecting the escape of persons, and preserving property from the upper windows of houses when in a state of conflagration, so as to render egress and ingress at the lower parts impracticable, may be seen by the plate, fig. 1. It is there shown as in use, and consists of a very simple and portable

able apparatus, of which *a*, fig. 2, is a section of the pole, which reaches up to the window, and on the front of it is fastened a plank or board, *b*, fitted to a groove or rabbet, *c*, on the back of the car; by means of this groove, the car slides upon this plank along the pole. A rope attached to the car passes over a pulley at the top of the pole, down a channel, *d*, at the back of the pole, covered with plate iron to guard the rope from injury by fire, and is then brought under another pulley at the bottom of the pole; by the assistance of this rope, those who are in the street may raise and lower the car without the least difficulty; persons may ascend and descend without the smallest danger; many lives may be preserved, and much property rescued from the devouring flames. Fig. 3, shows the car detached, which is constructed with a strong back and rabbets as before described; and, in the front are hoops to enclose and prevent the possibility of persons falling out: the hoops and bottom of the car for the convenience of compactness and portability are made to fold with joints and hinges, as seen in fig. 4, but can be expanded and locked fast by the hooks without any delay.

The Silver Medal *was this Session voted to Mr.* Edward Parker, *of No. 6, High Holborn, for a single Door-Spring. The following Communication was received from him, and one of the Door-Springs is preserved in the Society's Repository.*

SIR,

Having made an improvement in the single door spring, I wish to submit the same to the Society of Arts, &c. for their consideration.

The spring is a regulating one, and combines several advantages over those already in use, as it is the most simple in its construction, and, consequently, not subject to be out of order. It can be applied without the usual inconvenience of cutting away the door, and the strength can be either increased or decreased according to the weight of the door, and the pressure of air, which at times prevent the door shutting: they are also cheaper, considering the difference in the cost of fixing. The price of the common size is one guinea, the extra five-and-twenty shillings.

Should the spring meet the Society's approbation, I hope I shall be deemed deserving some mark of their attention.

I am, Sir,
Your obedient humble Servant,
EDWARD PARKER.

No. 6, High Holborn, March 6th, 1816.

To C. Taylor, M.D. Sec.

Reference

Plate 26.

Mr. Edward Parker's Single Door Spring

Fig. 2.

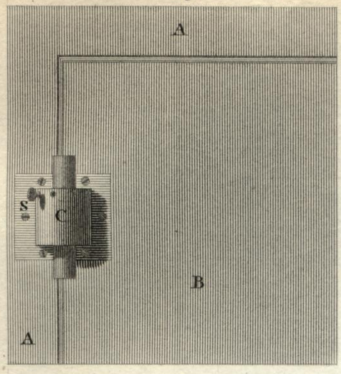


Fig. 10.

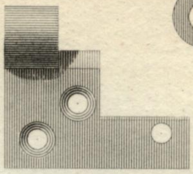


Fig. 12.

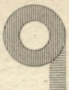


Fig. 11.

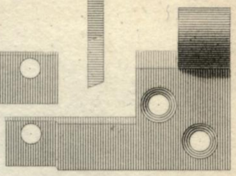
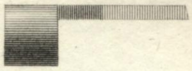


Fig. 13.



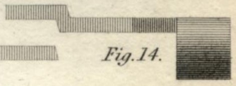


Fig. 14.

Fig. 8.

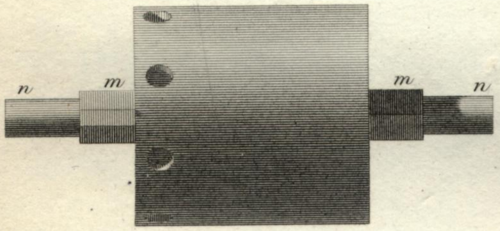


Fig. 9.

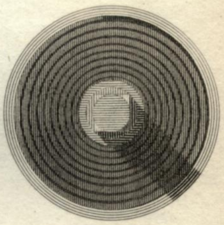


Fig. 1.

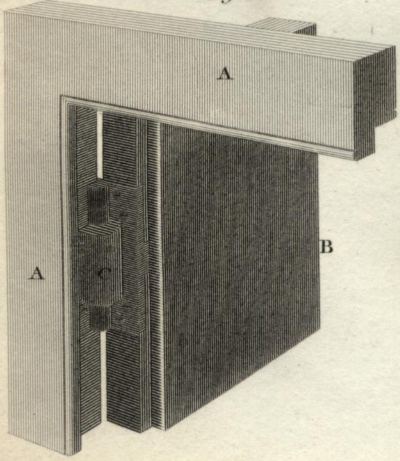


Fig. 3.

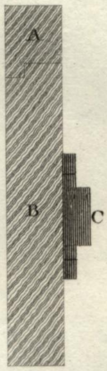
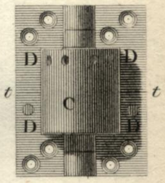


Fig. 6.



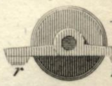


Fig. 7.

Fig. 4.

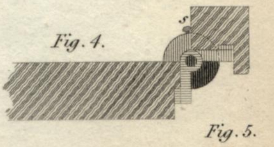


Fig. 5.

Reference to the Engraving of Mr. PARKER's *Door-Spring. Plate* 26.

Fig. 1, is a view of the door-spring fixed to the upper part of the door, and to the upper part of the door-frame. The interior spring coils round a centre-pin in several revolutions, as afterwards exhibited, and is fastened at one end by passing through a mortice in the centre-pin. When the door turns round, the centre-pin turns at the same time, and compresses the interior spring by the re-action of the other end of the spring, which is fixed to the concave surface of the barrel in which it is enclosed, The upper part of the barrel is pierced with eight equidistant holes which are perpendicular to the axis of the centre-pin; by this means the barrel is prevented from turning round by inserting a pin or screw with a projecting head, which rests upon a plate attached to the frame on the side of the door on which it opens, so that when the door is shut, the spring is at liberty, but as it opens it exerts a greater force as the angle enlarges. The advantage of having so many holes is, that the action of the spring upon the door may be increased or lessened in any degree by putting the pin in a different hole.

A, A, part of the door-frame.

B, part of the door.

C, the barrel containing the spring. In this view, one of the eight holes is seen entire, and another in part. The stop pin is hid, being on the other side.

Fig. 2, an orthographic representation of a part of the door on the opening side. In this representation of the door-spring, four of the holes are shown, and the pin is shown at *s*, as inserted in one of the holes.

Fig. 3, a section of part of the door and door-frame, showing the projection of the barrel and hinge.

Fig. 4, a section of part of the door and door-frame opened to a right angle, showing the section of the hinge and the pin at *s*, as stopping the barrel.

Fig. 5, the pin by itself.

Fig. 6, the barrel, with the hinge D, D, D, D, folded out; the lines at *t*, *t*, show the joint where the two parts come together.

Fig. 7, end of the same, showing the end of the hinge, and end of the barrel; and, the projecting parts, *r*, *r*, show the lapping of the one part of the hinge upon the other.

Fig. 8, an orthographic representation of the barrel and arbor, or centre-pin; the arbor is square at *m*, *m*, next to the barrel, for receiving the part of the hinge which is screwed or attached to the door, so that when the barrel is stopped by the pin, and the door in the act of opening or shutting, the part of the hinge which is attached to the door carries the arbor or spindle round with it, and the spring being stationary at the other end, makes it exert its force more or less as the door is opening or shutting. The parts, *n*, *n*, at the extremities of the arbor are rounded, so that the other part of the hinge which is attached to the door-frame may revolve freely thereon.

Fig. 9, a section of the barrel, spring, and arbor, shown by removing the end of the barrel.

Figs. 10 and 11, representations of the two parts of the hinge attached to the door-frame.

Fig. 12, end of the same, on a plane perpendicular to the arbor.

Figs. 13 and 14, representations of the edge of the hinge, showing how the two parts lap upon each other, which, when brought together, are fastened by a screw.

Mr. Roberts's Ventilator for Needle pointers.

Fig. 1.

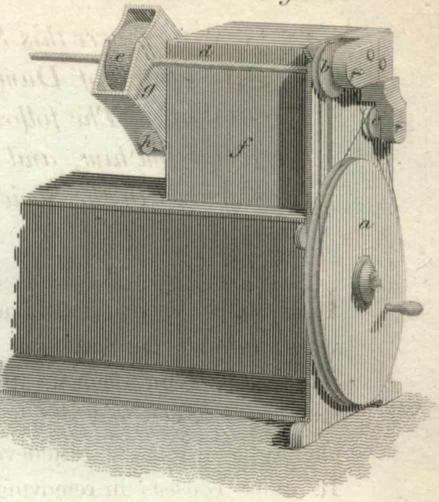


Fig. 4.

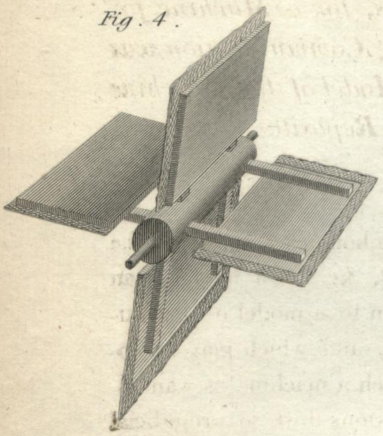


Fig. 2.

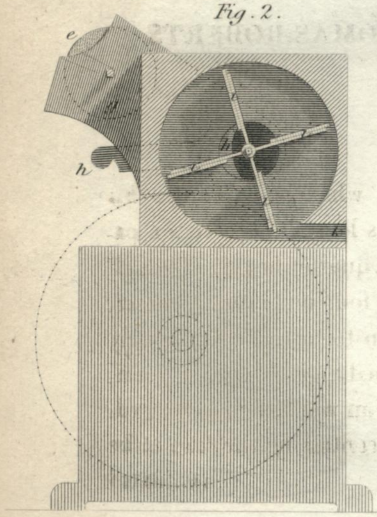
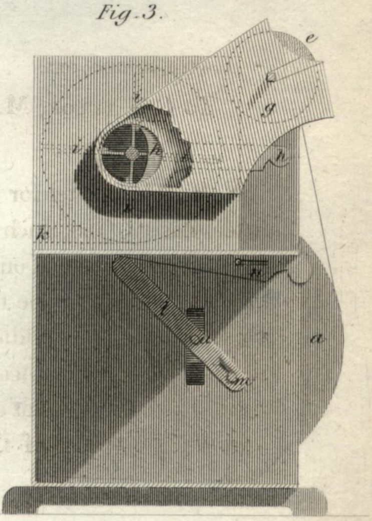


Fig. 3.



Drawn by W. Newton.

Engraved by S. Porter.

TEN GUINEAS *were this Session voted to Mr.* THOMAS ROBERTS, *of Dumfries, for a Machine for Ventilation. The following Communication was received from him, and a Model of the Machine is preserved in the Society's Repository.*

SIR,

HAVING in the year 1813 had the honour of receiving the approbation of the Society of Arts, &c. for a model of an elevator, I again solicit its attention to a model of a ventilator, upon a new and simple plan, and which may be applied to good purposes whenever such a machine is wanted. Its utility consists in removing noxious dust so prejudicial to persons employed in pointing needles on the dry grindstone, which will be particularly evident from inspection.

I remain, Sir,

Very respectfully your's,

THOMAS ROBERTS.

Dumfries, April 8th, 1815.

To C. TAYLOR, M. D. SEC.

N. B. The model for ventilating, which accompanies this letter, has its fans, each four inches long, in a direction parallel to the axes, and one inch and a quarter broad. Though the cylinder where the fans move is four inches in diameter, a cylinder in the middle is left open for a continual supply of air. When the wheel, *a*, is turned eighty times in a minute, sixteen and a half cubic feet of air would be discharged, admitting that part of the cylinder containing the fans to be ventilated each turning. A machine, having the fan-box sixteen inches cube, would ventilate at the rate of nearly 1100 cubic feet in one hour.

Reference to the Engraving of Mr. THOMAS ROBERTS's *Model of a Ventilator. Plate 27.*

Fig. 1, represents the machine in perspective, *a*, the great wheel giving motion to the whole, which, on being made to revolve, (by means of the connecting bands,) turns the lesser wheels, *b* and *c*: *b*, is a small wheel attached to the arbor or axle, *d*; upon this arbor is the grindstone, *e*: *c*, is a small wheel upon the axle of a fan wheel, shut up within the box, *f*.

Figs. 2 and 3, are sections of the same, showing the interior of the fan-box, with the passages for conducting and discharging the dust.

The grindstone being in action, as represented by the first figure, small particles of steel or dust will pass down the funnel, *g*, in which the grindstone hangs, and thence through the circular aperture into the fan-box, (part of the funnel being removed in fig. 3, to show this,) which aperture may be contracted by the sliding-shutters, *h*, *h*.

Fig. 4, the fan-wheel, marked *i*, *i*, *i*, *i*, in figs. 2 and 3, which, being turned with considerable velocity, by the wheel and band (seen at *c*, fig. 1) impels the wind and dust out through the opening, *k*, at the back of the fan-box.

Fig 3, likewise exhibits a method of tightening the bands by shifting the centre of the great wheel which hangs in the slider, *l*; this slider moving upon the pivot, *m*, can be raised or lowered, and with it the great wheel by the wedge, *n*, being drawn backward or forward.

The SILVER MEDAL *was this Session voted to Mr.* JOHN GOODWIN, *of Carlton House, for his Probang for administering Medicine to Horses. The following Communications were received from him on the Subject, and one of the Instruments is preserved in the Society's Repository.*

MY LORDS AND GENTLEMEN,

HAVING invented an instrument for the purpose of giving horses balls without the necessity of introducing the hand into the mouth, I beg leave to lay the same before you, and am, with great respect,

Your obedient Servant,

JOHN GOODWIN.

Carlton House, Nov. 8th, 1815.

To the Society for the Encouragement of Arts, &c.

MY LORDS AND GENTLEMEN,

I CONCEIVE it necessary to lay before you some observations on the utility of the horse-ball probang.

I am,

Your obedient Servant,

JOHN GOODWIN.

Carlton House, Nov. 9th, 1815.

To the Society, &c.

The use of the horse-ball probang is for the purpose of giving medicinal balls, without the customary necessity of introducing the hand and arm into the horse's mouth, thereby avoiding the possibility of being wounded by the horse's jaws, an accident by no means unfrequent.

For breeding studs, where it is a prevailing practice to give medicines so early as a few months old, from this period up to the adult state, the groom's hand has been found too large to be admitted; but, in order to give medicine, a very dangerous and uncertain practice has been resorted to, viz. to thrust a ball into the throat with a stick; by which method, the animal has been frequently wounded about the top of the throat, and the receiving the medicine rendered very uncertain. In the generality of cases, the ball was broken in the mouth, disappointment in the effect invariably followed, and the animal nauseated with the aloes, &c. sticking to his jaws, frequently for ten days or a fortnight. All these untoward circumstances attending the giving balls to young stock, are totally avoided by my method, as the ball invariably goes down without any obstruction. My instrument has been in use with great success for the last three years.

Mr. Goodwin begs leave to lay before the Society of Arts, &c. three Certificates in support of the horse-probang.

Carlton House, Nov. 14th, 1815.

To the Society, &c.

Certificates.

This is to certify, that I have used the ball-probang invented by Mr. Goodwin on a numerous and extensive stud of the Prince Regent for the last three years with the greatest success, and I do consider it to be of the greatest use;

and I am convinced, that many very young animals would be lost for the want of so valuable an instrument.

(Signed) Francis Bacon,
Stud Groom to the Prince Regent.

Hampton Court Park, Nov. 12th, 1815.

This is to certify, that the ball-probang made and sold by me, is the invention of Mr. J. Goodwin, veterinary surgeon to his Majesty, and that the great demand for them fully proves their superiority over all other inventions for giving physic to horses without introducing the hand into the mouth, and particularly to foals.

Richard Long,
Veterinary Instrument-maker to his Royal
Highness the Prince Regent, the Army, &c.

Nov. 13th, 1815.

N. B. Instruments have been furnished to his Royal Highness the Prince Regent, his Royal Highness the Duke of York, his Grace the Duke of Rutland, the King of France, and a number of professional and sporting gentlemen.

This is to certify, that I have used the ball-probang invented by Mr. Goodwin on a numerous stud of the Duke of Rutland sixteen months, with the greatest success; and I do consider it to be a most useful and valuable instrument.

(Signed) William Fenwick,
Training and Stud Groom.

The instrument is particularly useful in giving foals physic, &c. when the hand cannot be admitted.

Cheveley Park, Newmarket, Nov. 12th, 1815.

SIR,

I HAD the honour to receive your letter of the 28th inst. to request my attendance to-morrow evening at the Society of Arts, to consider the merits of Mr. GOODWIN'S invention of a ball-probang for horses. I am sorry that a severe domestic calamity (from the fire at Kentish Town) will prevent me that pleasure; but I feel it my duty to say, that, in my opinion, the invention is ingenious, and although not necessary in general practice, yet for foals, and for small mouthed and vicious horses it may be particularly useful. I should however add, that I have had no *practical experience* of the merits of this instrument.

I am, Sir,
Your most obedient humble Servant,
EDWARD COLEMAN.

Veterinary College, Nov. 29th, 1815.
Mr. WOODFALL, Assistant SEC. &c.

SIR,

IN consequence of indisposition, I am prevented doing myself the pleasure of attending your Committee this evening. The cause of my addressing you is respecting a most ingenious and useful instrument called the *horse-probang*. Having witnessed its operation, I am decidedly of opinion it will be found extremely useful as a veterinary instrument for all *breeding studs*. I trust, from its merits, that the invention will be duly rewarded by the Society.

I am, Sir,
Your obedient Servant,
J. FISHER.

Mr. WOODFALL, Assistant SEC.
The Agricultural Repository, Winsley Street, Oxford Street, November 29th, 1815.

Reference

Reference to the Engraving of Mr. J. Goodwin's *Probang, for administering Medicine to Horses. Plate* 18.

Fig. 1, the probang, chiefly made of steel, and about one-third of its real size: *a*, the cup, in which a ball of medicine is to be put, the ball resting on a plate or piston, *b*, within the cup, as shown in the section, fig. 2; this plate is made fast to the top of the bar, *c*, fig. 3, to which the stock or handle is also attached: the cup, *a*, is screwed to a steel spring, *d*, fig. 4, at the back of the bar, *c*, figs. 1 and 3, and to which the trigger, *e*, is also affixed by a screw in it, which slides along a slit, *f*, in the bar, *c*, fig. 3, and its hook, *g*, forced up by the spring, *q*, locks in a hole, *h*, in the bar, *c*. When the probang is introduced into the horse's mouth to its farthest extremity, the trigger is pulled back, which withdraws the cup from off the ball, letting it drop into the horse's mouth, as shown in fig. 5, and then the instrument is withdrawn. The bar, *c*, is double, having a thin plate of brass, *i*, fastened to it its whole length, and to the stock at *i*, to prevent friction between the steel parts, and also fastened to the plate or piston, *b*; this is shown in fig. 5, at *i*, a little separated from the bar, *c*: *l*, is a guide-screw in the spring, *d*, sliding along the hole, *m*, in the bar, *c*: *n*, is another slit in the same bar, *c*, through which the screw, *o*, which connects the cup, *a*, with the spring, *d*, slides. The trigger, *e*, has a friction-roller at *p*, which rolls upon the bar, *c*, and in which is a groove for the spring, *q*, which throws up the trigger to pass: fig. 6, is a section to show it; the spring *q*, is widened at the point, to prevent its falling into the hole, *f*, of the bar, *c*.

The

The Silver Medal *was this Session voted to Mr.* Jonathan Dickson, *of Holland Street, Blackfriars, for his Method of propelling Steam-Boats. The following Communication was received from him, and a Model of the Improvement is preserved in the Society's Repository.*

SIR,

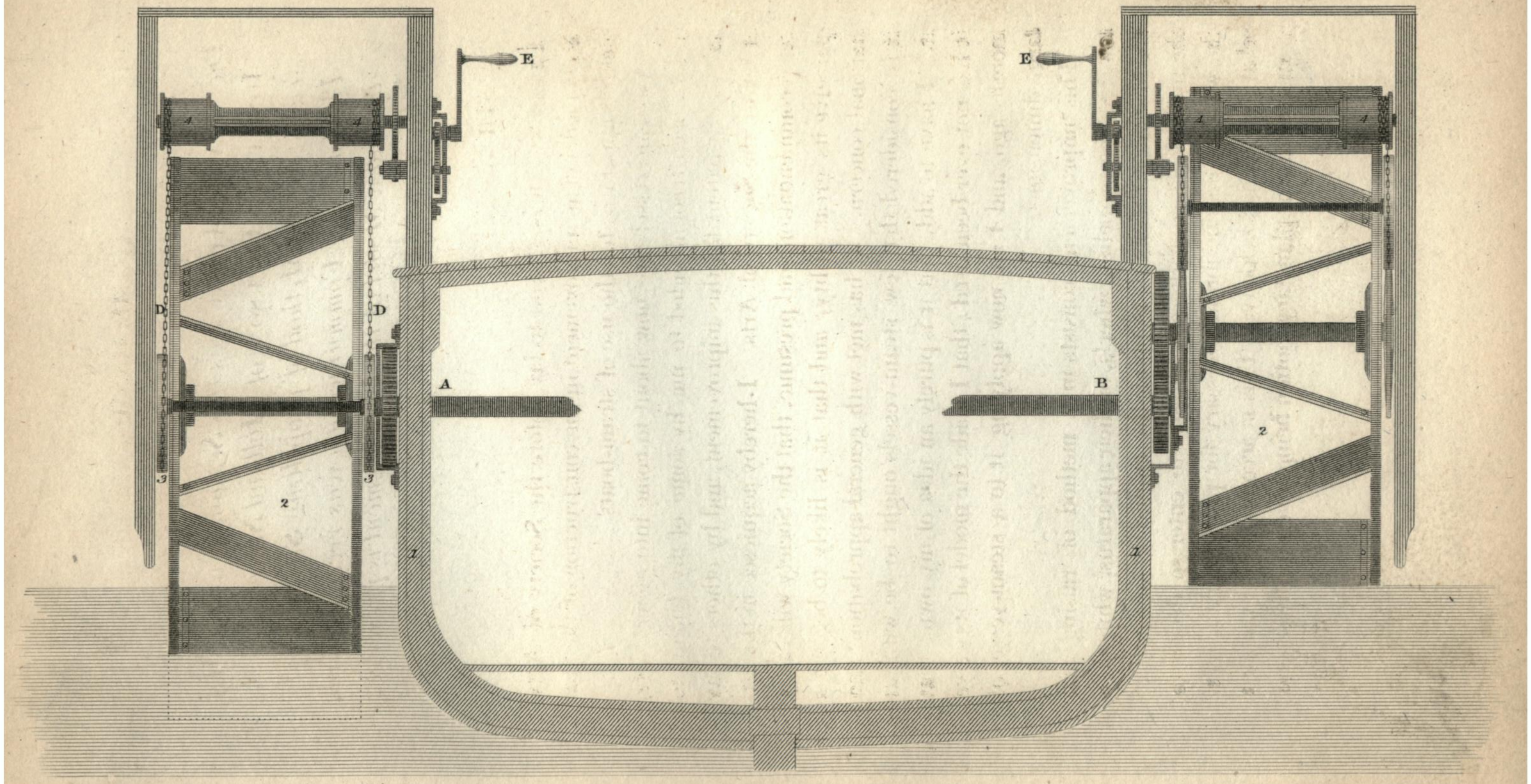
I beg leave through you to lay before the Society of Arts, &c. a model of an improvement in the construction of the propelling apparatus for the use of steam-boats.

As steam vessels are now about to come into general use, it has been recommended to me by some of my friends to take out a patent for this improvement, and by others to lay it before the Society of Arts. I hereby acquiesce in the latter recommendation, and presume, that the Society will easily perceive its great utility, and that it is likely to become a national concern. It has met with general approbation, and it is considered that few steam-vessels ought to be without it. I have to add, that it is purely an idea of my own; that it has not ever been used; that I made the model of it twelve months ago, and I am now applying it to a steam-vessel of large dimensions.

This improvement consists in a method of raising and lowering the propelling wheels, or their apparatus, while they are in motion, without stopping the engine or any part of the machinery, and thereby allowed to enter so deep into the water as may be found necessary for propelling the vessel at its intended velocity. This is accomplished by means of an eccentric or planetary motion being given to the second motion

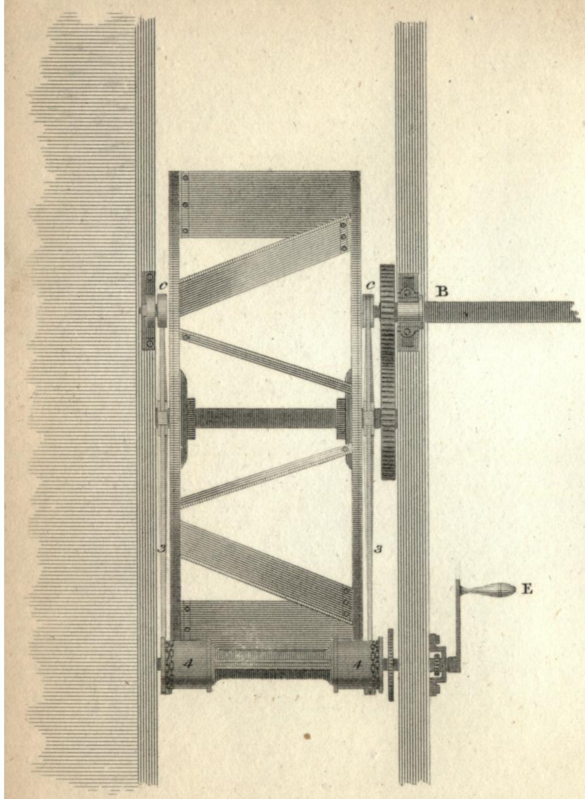
Pl. XXVIII.

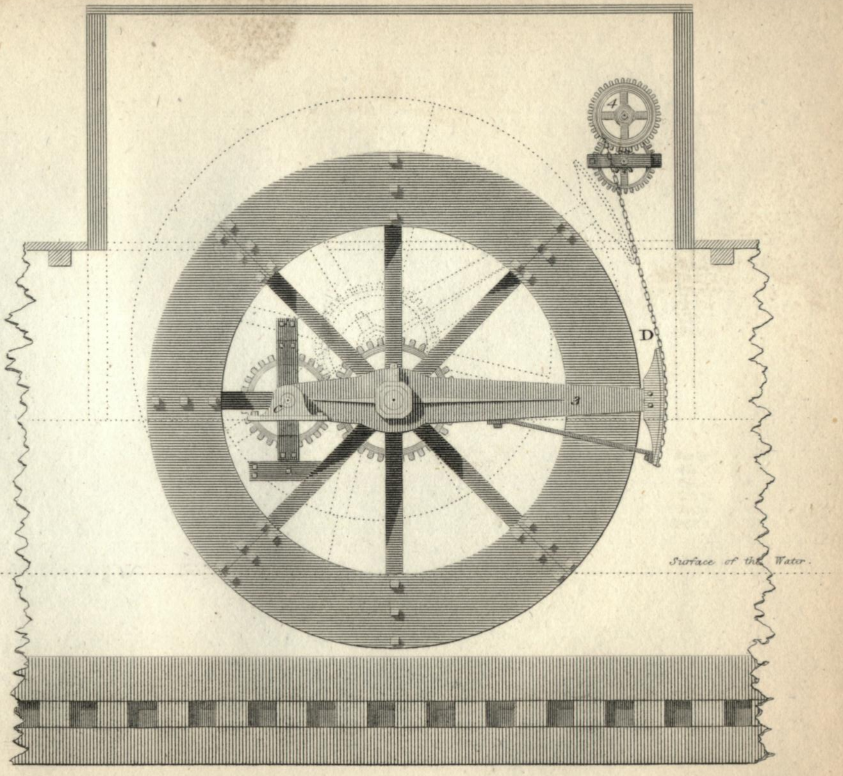
Mr. Jonathan Dickson's Improved Method of Propelling Steam Boats.



Drawn by J. Dickson

Mr. Jonathan Dickson's Improved Method of Propelling Steam Boats.





Drawn by J. Dickson.

Engraved by S. Porter.

motion of the machinery, which enables it to move partly round the first motion or driving power. In the model I have applied a screw to raise the levers which carry the propellers, but it can be done either by a pinion working in a segment of a wheel, whose radius is equal to the length of the lever, or a common rack and pinion, or endless chain, which last is likely to be the most convenient. All steam-vessels, hitherto in use, have suffered a great inconvenience owing to their propelling wheels being fixed to a certain depth in the water, and having no means of relieving them according to the load they have to carry; but the great utility of this improvement will hereafter be found by those steam-vessels that may carry sails, and perhaps be the only means of enabling steam-vessels to proceed to sea; for instance, suppose a steam-vessel to be going direct against the wind by means of the whole power of her steam engine, and that the wind should change and become favourable, the propellers may, by these means, be immediately raised out of the water, and the vessel allowed to have the whole effect of the sails, thereby saving the expence of fuel. All steam-vessels now in use experience so great an impediment from the propellers being always in the water, as to render sails of no use. Another advantage will be derived when there is only a gentle breeze in the vessel's favour, as the propellers can be set to work, which will take hold of the water at pleasure, and thereby unite the power of the steam to that of the wind, which will secure the passage in the given time, at much less expence, as the engine will only consume fuel in proportion to the labour it has to perform. A farther advantage will be found when the vessel has only a side wind, for, by the use of this contrivance, one of the propelling wheels can be worked with its full power in the water, and the other entirely lifted out, if necessary, (still the whole kept in motion, and thereby the direct course of the vessel be maintained.) A still farther advantage may be derived from the use of this improvement, when a vessel might meet with the loss of her rudder; for, by the propellers being worked on this plan, the vessel may be steered as well without the rudder, as either of the propellers may be raised or lowered immediately, and thereby the course of the vessel varied. The use of the propellers upon this plan will be conspicuously advantageous where a sudden tack is necessary (perhaps to save the vessel,) as she could be turned nearly upon her centre at pleasure.

I have thus endeavoured to point out a few of the advantages which this improvement possesses.

I am, respectfully, Sir,
Your obedient humble Servant,
JONATHAN DICKSON.

Holland Street, Blackfriars Road, April 24th, 1816.

To C. Taylor, M. D. Sec.

The Silver Medal *was this Session voted to Mr.* Thomas Perry, *of Farnham, for his Anuchronomerist, or Instantaneous Calculator.*

Of this instrument no engraving or description is published by the Society, as the inventor has done so already.

The THANKS *of the Society were this Session voted to Mr.* JAMES HORNE, *of Bankside, for a new Door Fastening. The following Communication was received from him, and one of the Instruments is preserved in the Society's Repository.*

DEAR SIR,

I SHOULD feel obliged by your laying before the Society of Arts, &c. a new door fastening of my invention, which I call *the traveller's guardian*, of a much more secure and simple construction than any thing of the kind now in use; it is intended to be introduced between the door and jamb, thus acting as a wedge and screw in such a way as to make it impossible to force a chamber-door open, at least without waking the person sleeping in the room. It has also the advantage of leaving no conspicuous marks, so that it may be repeatedly applied upon the best finished doors without injury. I scarce need add, that it is also a very good cork-screw; a useful article in a traveller's pocket. I should not have sent this to the Society thus late in the Session, had not the pattern got down into the country.

I am, dear Sir, Respectfully your's,

JAMES HORNE.

Bankside, April 18th, 1816.

To C. TAYLOR, M. D. SEC.

Description of the Instrument.

A stout screw, resembling a cork-screw; with a solid worm, the end of which is formed into a brad-awl; when used, it is to be screwed between the door and door-case. The edges of the screw indent themselves both into the door and door-case, which render it impossible to force the door open without alarming or awakening the traveller. It also answers the purpose of a cork-screw, the screw fitting into the hollow handle.

The THANKS *of the Society were this Session given to Mr.* MARTIN CAWOOD, *of Leeds, for his Communication of a Method of connecting Water-Pipes. The following Letter was received from him on the Subject.*

SIR,

I HAVE been much astonished in contemplating the old fashioned manner of connecting water pipes in London; and having seen a list of the Society's premiums, in which I have observed one for *laying Wooden Pipes*, I am induced to communicate a plan which perhaps might be useful if generally adopted: at the same time, I must observe, that I do not lay claim to the invention.

As an iron-founder, about twelve years ago it fell within my business to cast the connecting parts of the pipes for the Otley Water Works, which are situated within ten miles of Leeds, and which has induced me to forward the model of a plan which I have thought might answer for connecting water-pipes. I am, Sir, With great respect,

Your obedient Servant,

MARTIN CAWOOD.

To C. TAYLOR, M.D. SEC.

Mr. CAWOOD'S Model consisted of rough pieces of wood, representing the unpolished tree, from which the pipes were formed. They were to be united by a cast-iron connecter, and iron hoops were to be inserted at the ends of the pipes to prevent them from bursting.